

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## **M E M O R A N D U M**

**TO:** John Mitnik, Chief, Engineering and Construction Bureau  
Paul Linton, Administrator, Water Control Operations Section

**FROM:** SFWMD Staff Environmental Advisory Team

**DATE:** June 21, 2016

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### Kissimmee

On Sunday, stage in East Lake Toho was 0.5 feet below schedule; Lake Toho and Kissimmee-Cypress-Hatchineha was 0.8 feet below schedule. Over the past week, discharge at S65 averaged 3,194 cfs and at S65A 4,455 cfs; discharge at S65E averaged 7,216 cfs. Tuesday morning discharges: S65 ~2,930 cfs; S65A ~3,749 cfs; S65C ~4,664 cfs; S65E ~5,044 cfs. Dissolved oxygen (DO) in the Kissimmee River continued to be very low, averaging 0.77 mg/L over the past week and 0.79 mg/L on Sunday. Kissimmee River mean floodplain depth on Sunday was 2.33 feet.

#### Lake Okeechobee

Lake Okeechobee is at 14.92 feet NGVD having risen 0.19 feet over the past week despite continued large volume releases through S77 and S308. The Lake remains in the Low Flow Sub-band. Lake levels are too high for this time of year and there is a potential for negative impacts to apple snail reproduction and submerged aquatic vegetation. Various data sources indicate the presence of dense cyanobacterial blooms and associated toxins.

#### Estuaries

In the St. Lucie Estuary, total freshwater inflow declined compared to last week, averaging 4,122 cfs. Flow from the Lake was 1,560 cfs (38% of total flow). Salinity was about the same mid-estuary and increased in the lower estuary. The seven-day average salinity remained in the poor range for adult oysters at the US1 Bridge. In the Caloosahatchee Estuary, total freshwater inflow decreased compared to last week and averaged 10,674 cfs. Flow from the Lake was 4,289 cfs (40% of total flow). Salinity conditions in the upper estuary are suitable for tape grass. At the Cape Coral Bridge, salinity remained in the poor range for adult oysters, dropped into the fair range at Shell Point, and remained in the good range at Sanibel. The 30-day average salinity at the I-75 Bridge is below 5.

#### Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 100 acre-feet of Lake regulatory releases. The total amount of Lake regulatory releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 22,100 acre-feet. Most STA cells are above target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E, STA-1W, STA-3/4 and STA-5/6 and structure repairs are underway in STA-1E. In addition, nests of ESA and/or MBTA-protected species have been observed in STA-1E, STA-1W, and STA-5/6. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to the A-1 FEB, and A-1 FEB releases will be sent to STA-2 and STA-3/4.

## Everglades

Stage changes this week were mixed. Stages generally rose slightly but decreased in WCA-3B and northern Everglades National Park (ENP). The 30-day moving average salinity at the Florida Bay MFL site has decreased to 4.2 psu and the cumulative annual inflow from the five creeks into Florida Bay increased to 270,176 acre-feet. Florida Bay salinities are within 4 psu of their long-term averages.

## Weather Conditions and Forecast

Below average rains likely this week. A remnant boundary from the front that pushed through on Sunday has pushed back northward to the southern end of the peninsula. Moisture and instability are high around this boundary and quite low north of it. Thunderstorms will likely continue to focus near this boundary from Miami-Dade, Monroe, and southern Collier counties through this afternoon. High pressure will dominate the mid to upper levels of the atmosphere and is likely to rule the day beginning tomorrow. This high will effectively block energy coming from the west through north and moisture from the south, so the seabreeze will not have much external help. Look for showers/storms to spread northward as we move through the week, but coverage and intensity should remain below average through the weekend.

## KESSIMMEE BASIN

### Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.84 inches of rainfall in the past week and the Lower Basin received 1.48 inches (SFWMD Daily Rainfall Report 06/21/2016).

### Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table1.

**Table 1.** Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 6/21/2016													
Water Body	Structure/Site	Discharge (cfs), week's average**	Stage Monitoring Site***	Lake Stage (feet)	Schedule*	Regulation (R) or Target (S or T) Stage (feet)	Sunday Departure (feet)						
							6/19/16	6/12/16	6/5/16	5/29/16	5/22/16	5/15/16	5/8/16
Lakes Hart and Mary Jane	S62	166	LKMJ	60.4	R	60.0	0.4	0.0	-0.5	-0.1	0.2	0.0	0.0
Lakes Myrtle, Preston, and Joel	S57	2	S57	61.1	R	61.0	0.1	-0.4	-0.9	0.0	0.2	-0.1	0.0
Alligator Chain	S60	0	ALLI	62.6	R	63.2	-0.6	-0.8	-1.2	0.0	0.2	0.0	0.1
Lake Gentry	S63	0	LKGT	60.9	R	61.0	-0.1	-0.8	-1.4	0.0	0.3	0.0	0.0
East Lake Toho	S59	616	TOHOE	56.0	R	56.5	-0.5	-0.6	-0.6	1.0	0.8	0.7	0.7
Lake Toho	S61	1534	TOHOW, S61	52.7	R	53.5	-0.8	-0.5	-0.5	1.1	1.0	0.8	0.8
Lakes Kissimmee, Cypress, and Hatchineha	S65	3194	LKISSP, KUB011, LKISSB	50.2	R	51.0	-0.8	-0.8	-0.8	1.6	1.9	0.9	0.8

\* T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A= not applicable or data not available.

\*\* Seven-day average of weighted daily means through Sunday midnight.

\*\*\* Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

DATA ARE PROVISIONAL

### Lower Kissimmee Basin

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

**Table 2.** Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 6/21/2016

Metric	Location	Sunday's 1-day average	Weekly Average**									
			6/19/16	6/12/16	6/5/16	5/29/16	5/22/16	5/15/16	5/8/16	5/1/16	4/24/16	4/17/16
Discharge (cfs)	S-65	3271	3194	3940	2899	4304	2029	1480	1091	1125	1775	1812
Discharge (cfs)	S-65A	4130	4455	5649	3348	6187	4379	1352	1143	925	1656	1710
Discharge (cfs)	S-65C	5041	6224	5091	4792	6914	3320	1603	1337	1543	2082	2759
Headwater stage (feet NGVD)		34.0	34.1	34.1	33.9	34.2	34.3	34.1	34.3	34.0	34.1	34.0
Discharge (cfs)	S-65D****	5729	7361	5471	5186	7868	2979	1641	1391	1584	2132	2872
Discharge (cfs)	S-65E	5636	7216	5255	5005	7470	2873	1531	1268	1471	1983	2766
DO concentration (mg/L)***	Phase I river channel	0.79	0.77	1.44	0.48	0.72	3.62	6.06	5.94	5.65	4.84	3.82
Mean depth (feet)*	Phase I floodplain	2.33	N/A	3.12	1.75	2.81	3.09	0.71	0.80	0.57	0.94	1.08

\* 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

\*\* Seven-day average of weighted daily means through Sunday midnight.

\*\*\* DO is the average for PC62 and PC33 starting June 2. PC33 omitted for week of Aug16. DO for week of Sept 15-22 is for PC33 only.

\*\*\*\* S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2

\*\*\*\*\* 1-day spatial average from field measurements in Pools A and BC

N/A Not applicable or data not available.

DATA ARE PROVISIONAL

## Water Management Recommendations

### Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
6/21/2016	No new recommendations.			
6/14/2016	No new recommendations.			
6/7/2016	No new recommendations.			
5/31/2016	No new recommendations.			
5/24/2016	No new recommendations.			
5/17/2016	No new recommendations.			
5/10/2016	No new recommendations.			
5/3/2016	No new recommendations.			
4/26/2016	No new recommendations.			
4/19/2016	No new recommendations.			
4/12/2016	No new recommendations.			
4/5/2016	No new recommendations.			
3/29/2016	No new recommendations.			
3/22/2016	No new recommendations.			
3/15/2016	No new recommendations.			
3/8/2016	No new recommendations.			
3/1/2016	No new recommendations.			
2/23/2016	No new recommendations.			
2/16/2016	No new recommendations.			
2/9/2016	No new recommendations.			
2/1/2016	Begin F&W recessions in East Toho, Toho, and KCH per the requested recession lines shown in the 2015-16 Dry Season Standing Recommendation (SR). Use Table 2 for guidance on rates of change in discharge to control departures from the line in KCH, and the reversal guidelines shown in the SR for Toho and East.	Initiate and manage lake stage recessions in East Toho, Toho, and KCH for the benefit of fish and wildlife, while avoiding harm to the Kissimmee River	TBD	KB Tech Team
1/20/2016	Continue to adjust discharge at S65 to follow the 2015-16 Dry Season SR guidelines for rampdown at S65A. Balance discharge at the two structures to maintain at least minimum discharge to the river. As stage rises above 51 ft in KCH, temporarily bypass the Fig 1 discharge plan in the SR and manage discharge to let KCH stage rise to 51.5 ft (the Feb 1 recession starting stage) if conditions allow while following rampdown guidelines. If KCH stage rises further than 51.5 ft, we will reevaluate. As changes in discharge become necessary, continue to follow the Table 1 guidelines in the SR. Switch to Table 2 rampup/rampdown guidelines on Feb 1 or when the recession line is intercepted for management of the recession in KCH.	If conditions allow, let stage increase to 51.5 ft to intersect the Feb 1 starting stage for KCH F&W recession line.	Implemented	KB Tech Team
12/10/2015	Temporarily raise from 50.5 ft to 51 ft the threshold stage for increasing discharge at S65/S65A to 1400 cfs. This is a temporary modification of the current draft 2015-16 dry season Standing Recommendation (SR). Discontinue last week's temporary change in the rate of discharge increase and return to the original per-day rates shown in Table 1 of the draft SR - i.e., increase discharge to 1400 cfs at a rate of 150 cfs/day rather than 150 cfs/2 days. If KCH stage should start to decline while ramping up but before reaching 1400 cfs, begin to ramp back down using the rates in Table 1.	Slow the effect of discharge on KCH stage, balance KCH stage and KRRP discharge objectives.	Implemented	KB Tech Team

## KCOL Hydrographs (through Sunday midnight)

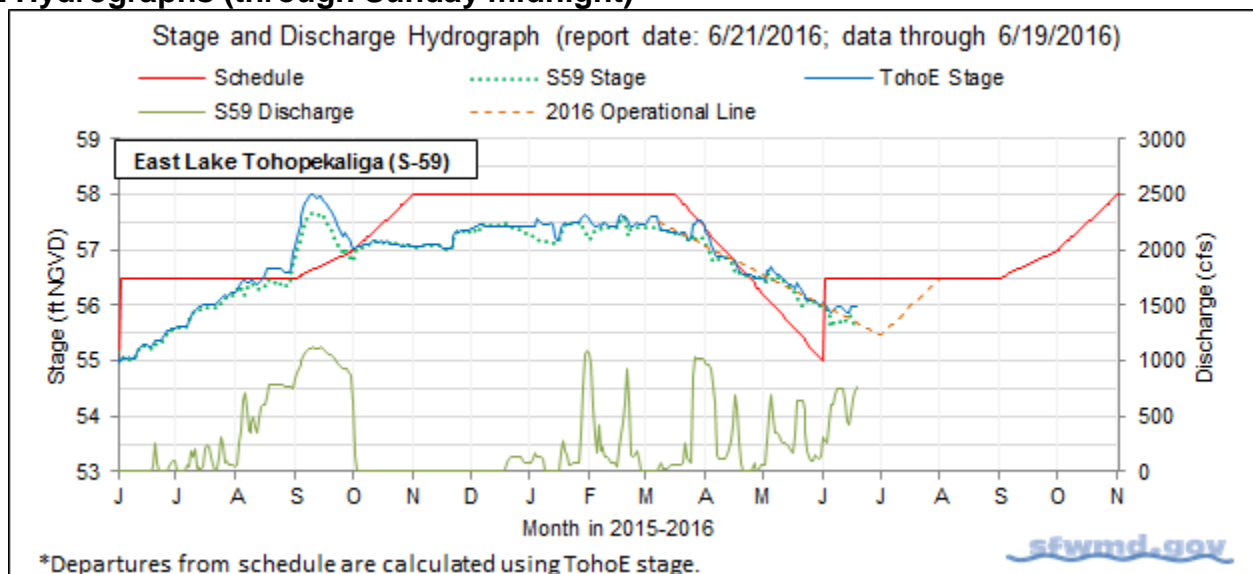


Figure 1.

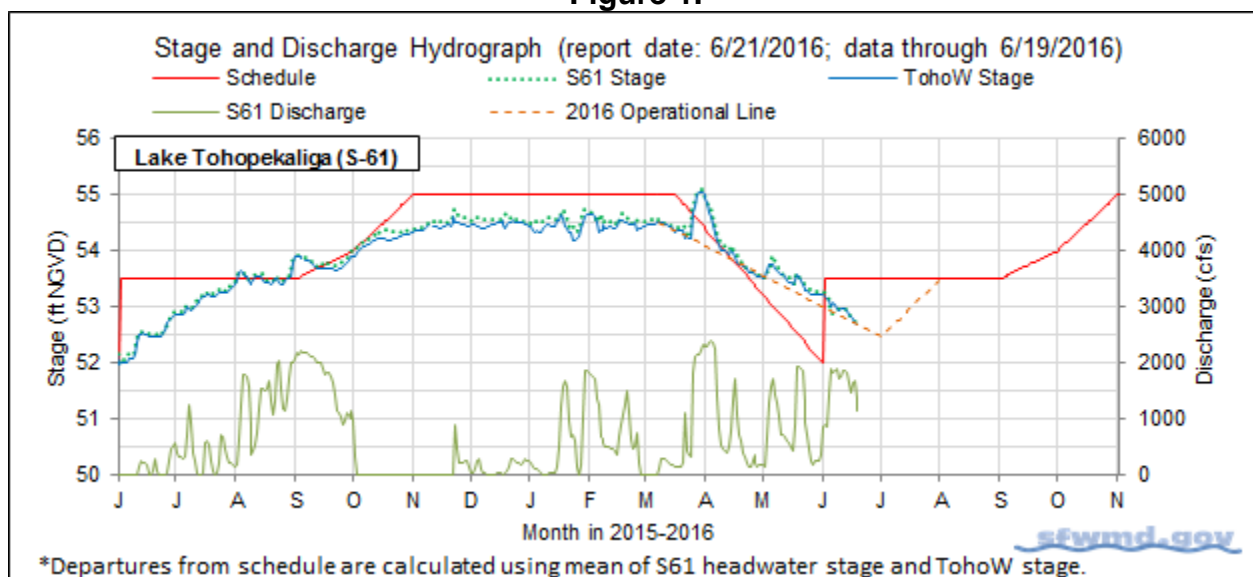


Figure 2.

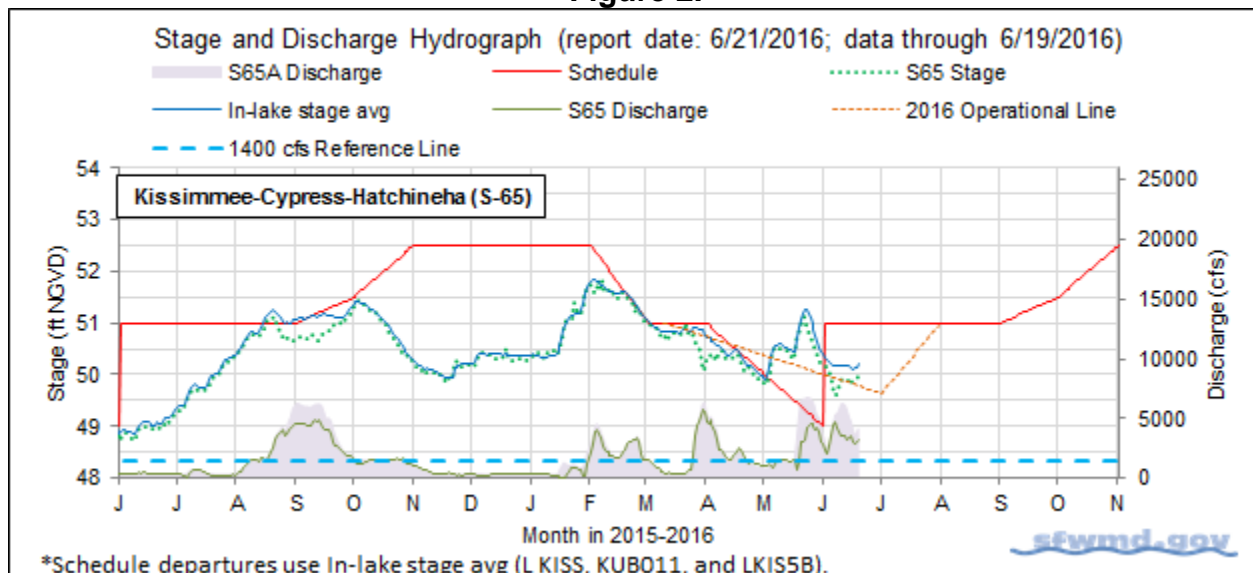


Figure 3.

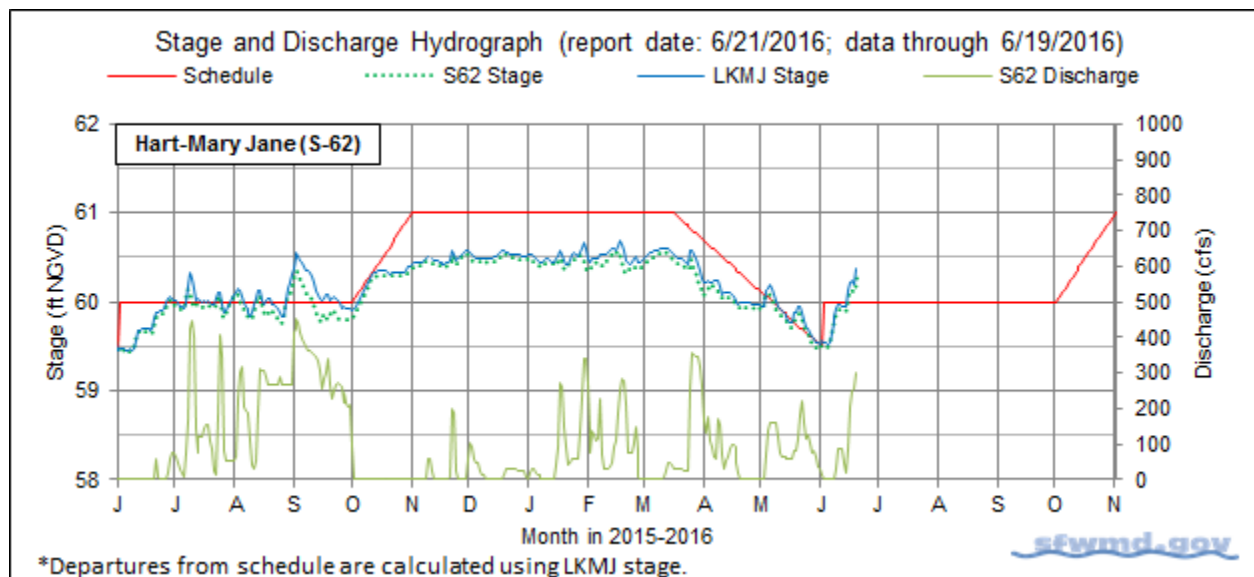


Figure 4.

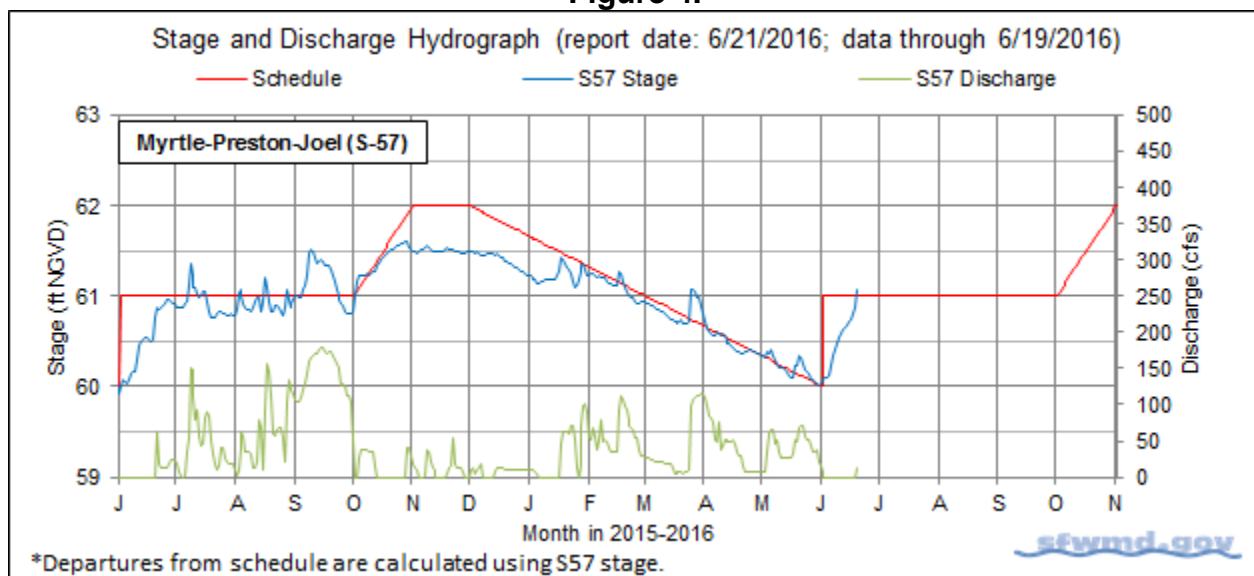


Figure 5.

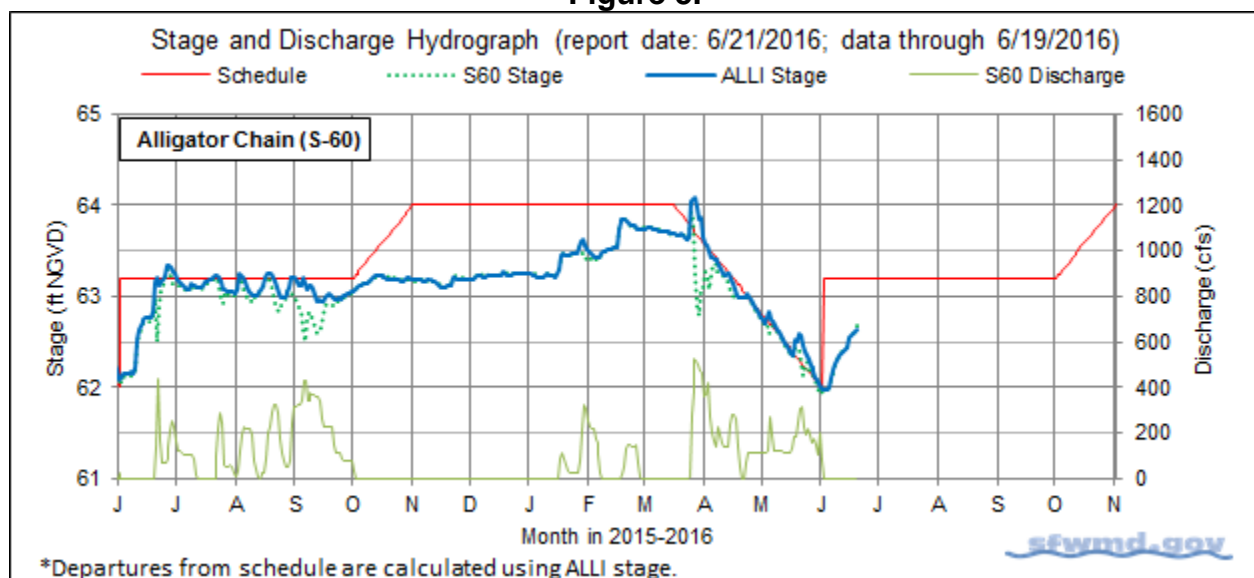
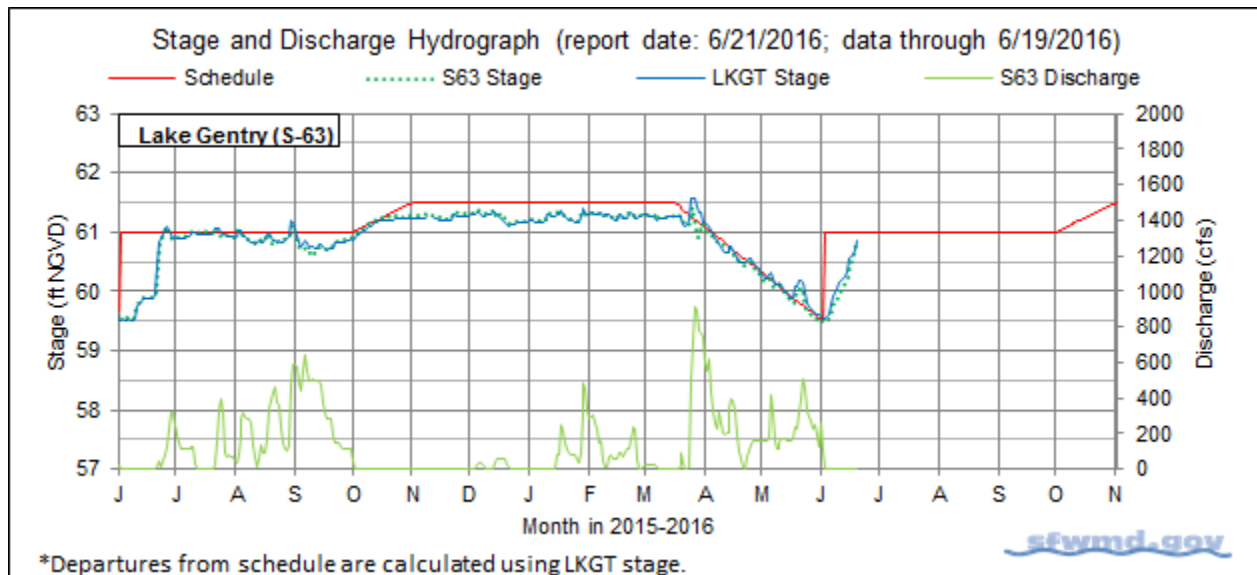


Figure 6.

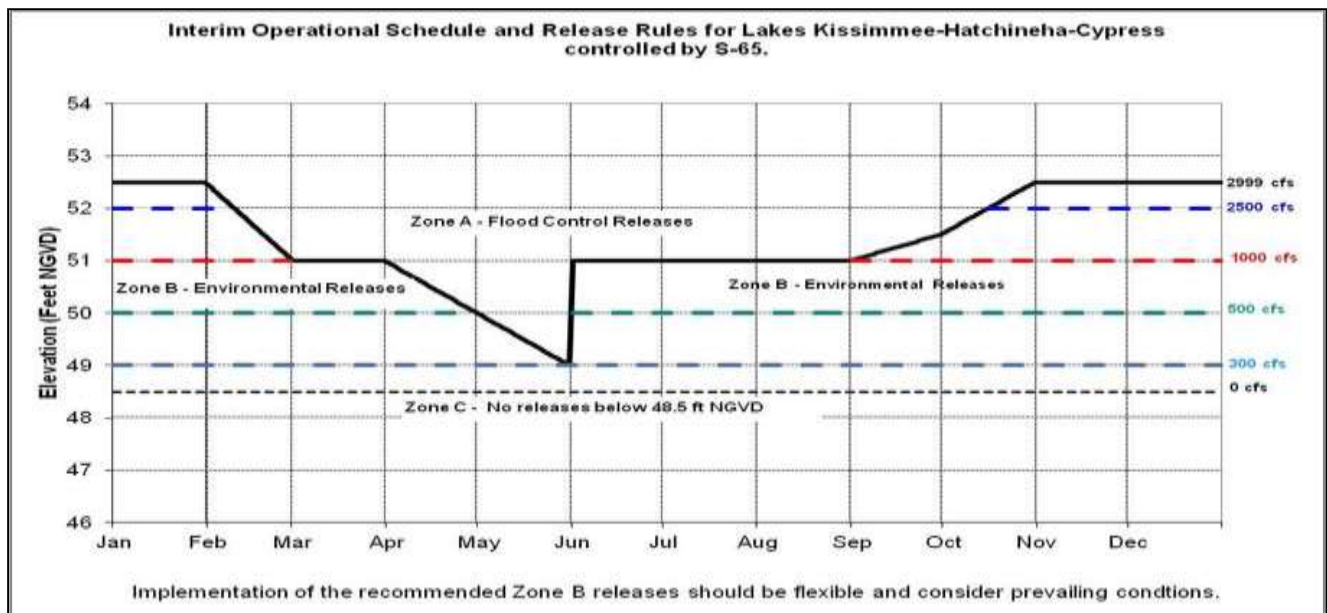




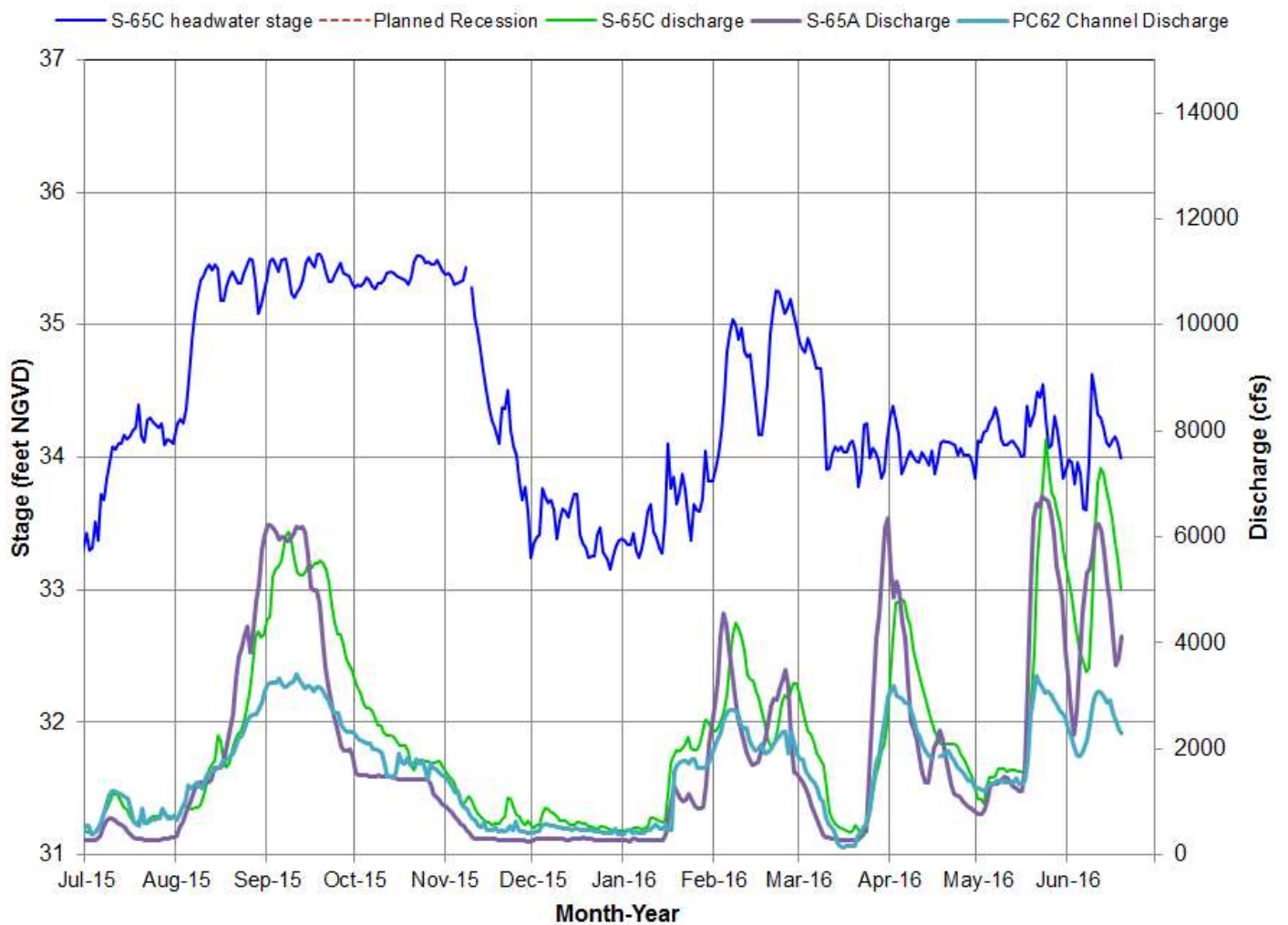
**Figure 7.**

Table 1. Discharge Rate of Change Limits for S65/S65A (Rate limits apply only in Zone B)			
	Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
Zone B	0-300	50	-50
	300-1400	150*	-75
	1400-2500	300	-300
	2500-3000	1000	-1000
Zone A	No limits		
<b>*DRY FLOODPLAIN RULE.</b> When the Kissimmee River floodplain is dry (>7 days at 300 cfs), increases above 1200 cfs should be made in consultation with LRE Operations (Steve Bousquin and David Anderson).			

**Figure 8a.** Limits on rate of discharge change at S65/S65A from the 2015-2016 Dry Season Standing Recommendation.

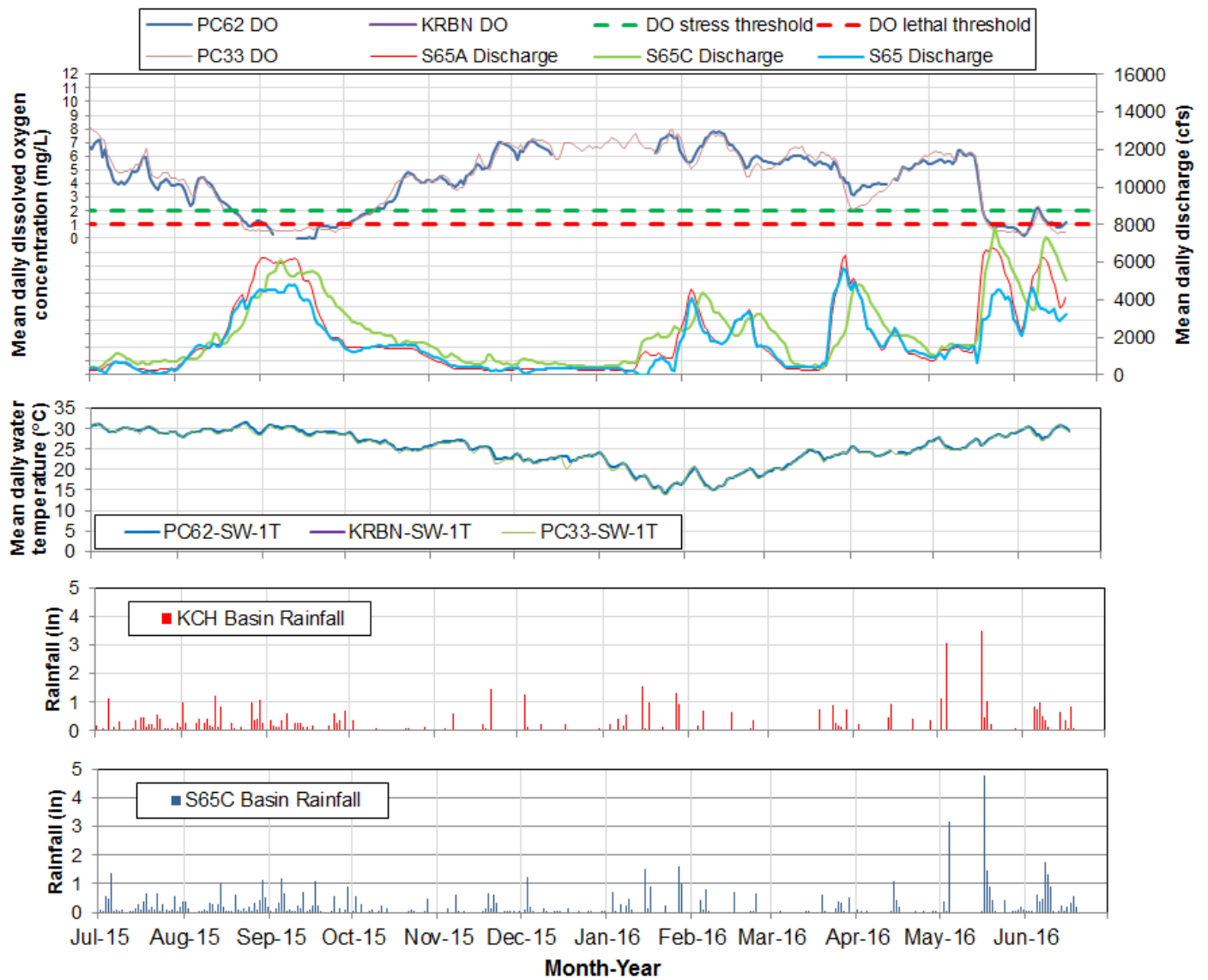


**Figure 8b.** Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

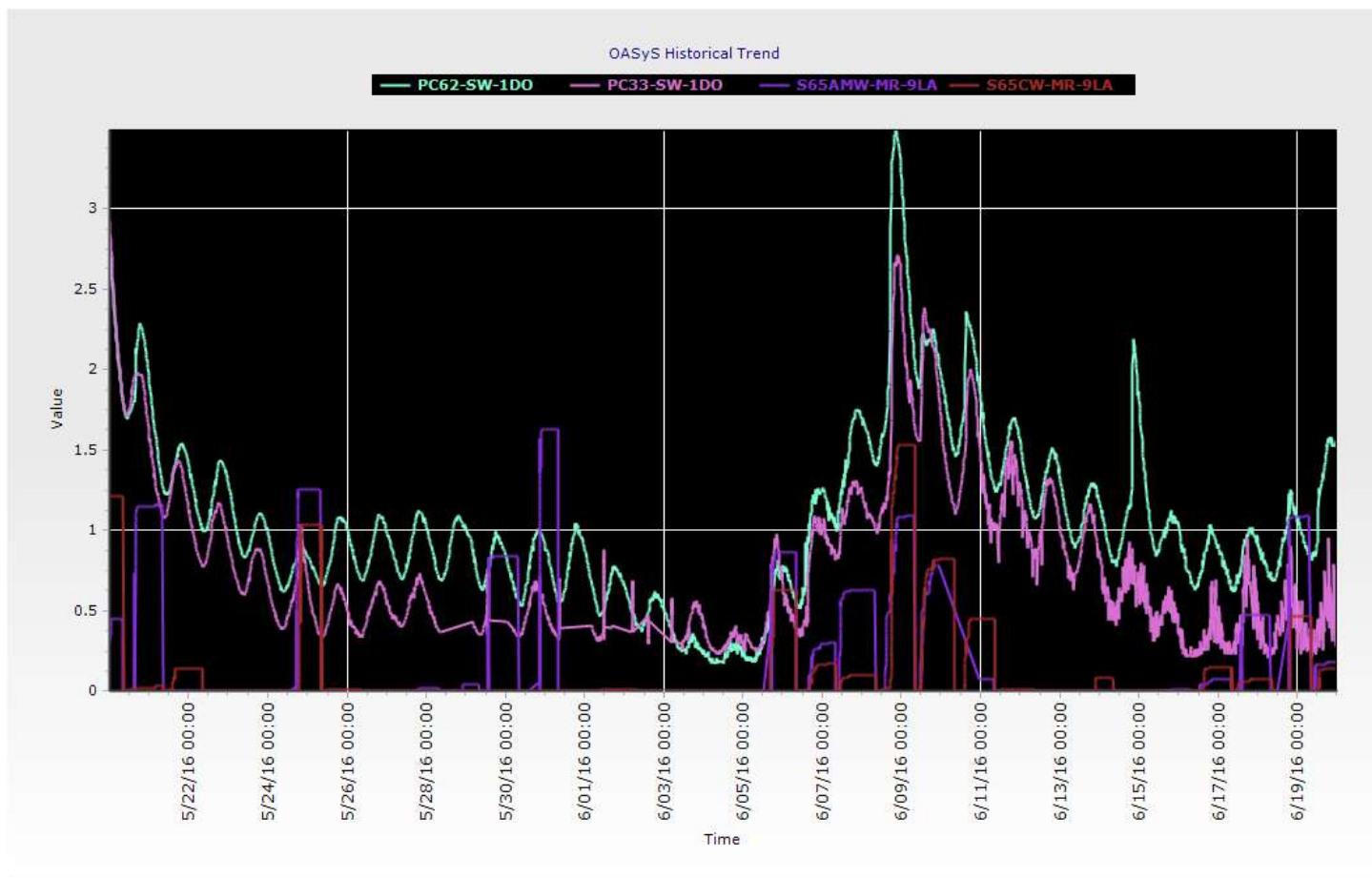


**Figure 9.** S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

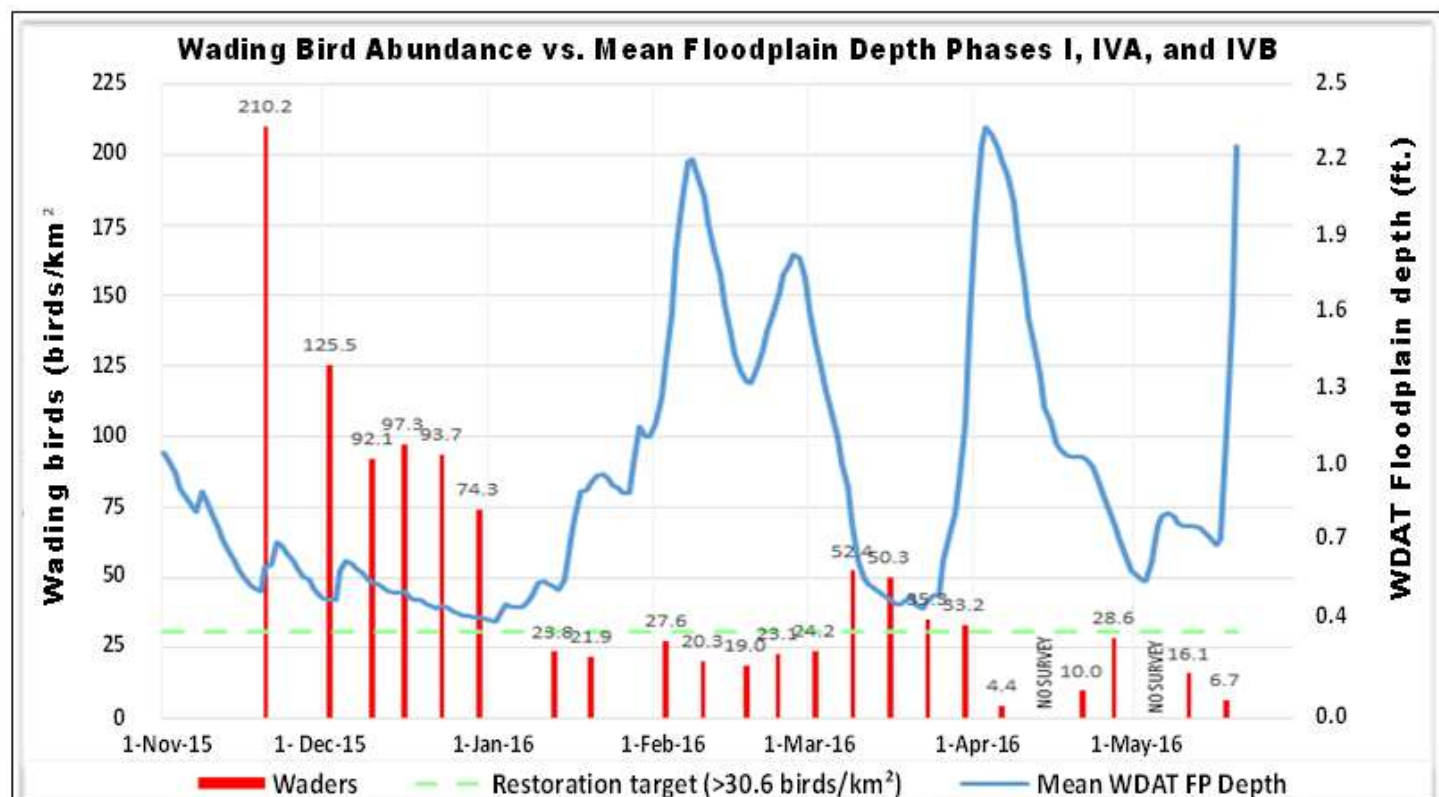




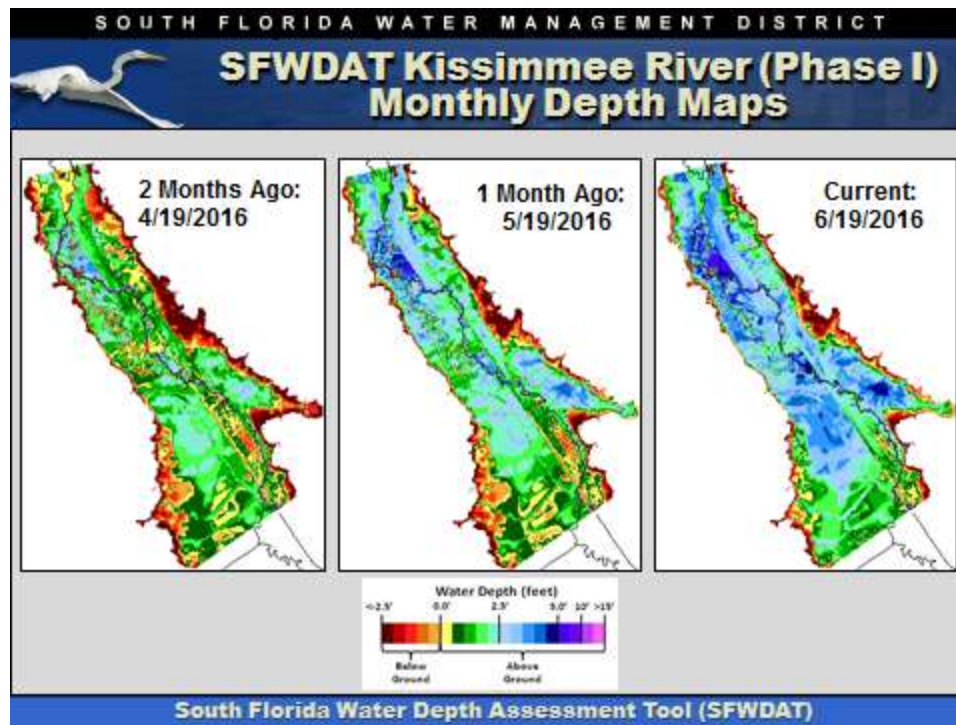
**Figure 10.** Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.



**Figure 11.** Phase I river channel dissolved oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

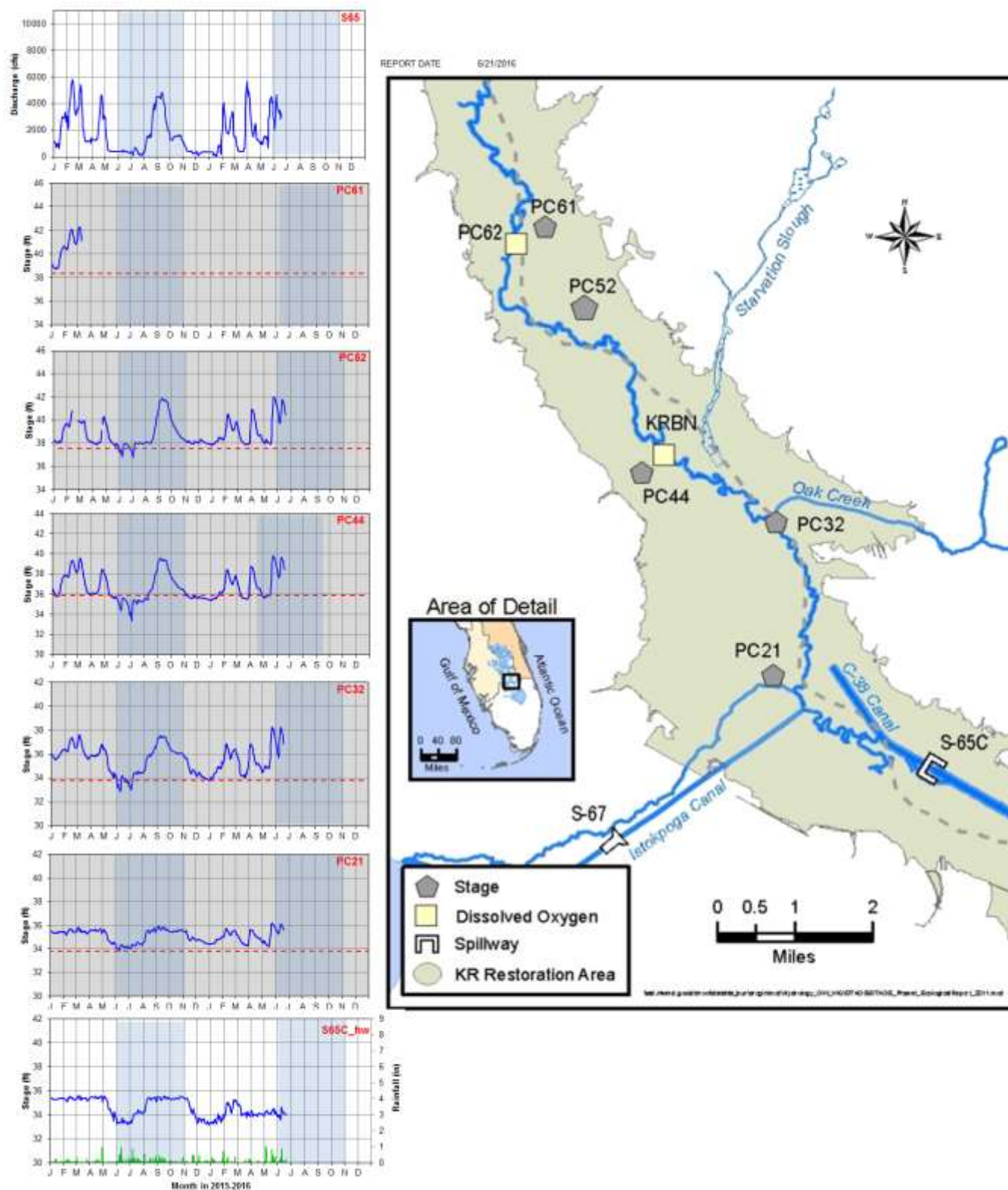


**Insert 1.** Wading bird abundance on the Kissimmee River floodplain in 2015-2016 dry season. Stage reversals (increases in water depth) are caused by increases in flow at S65/S65A following rainfall. Stage reversals affect the ability of wading birds to use floodplain habitats because they cannot forage in water that is too deep.



**Figure 12.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.

## Kissimmee River Hydrographs



**Figure 13.** Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.



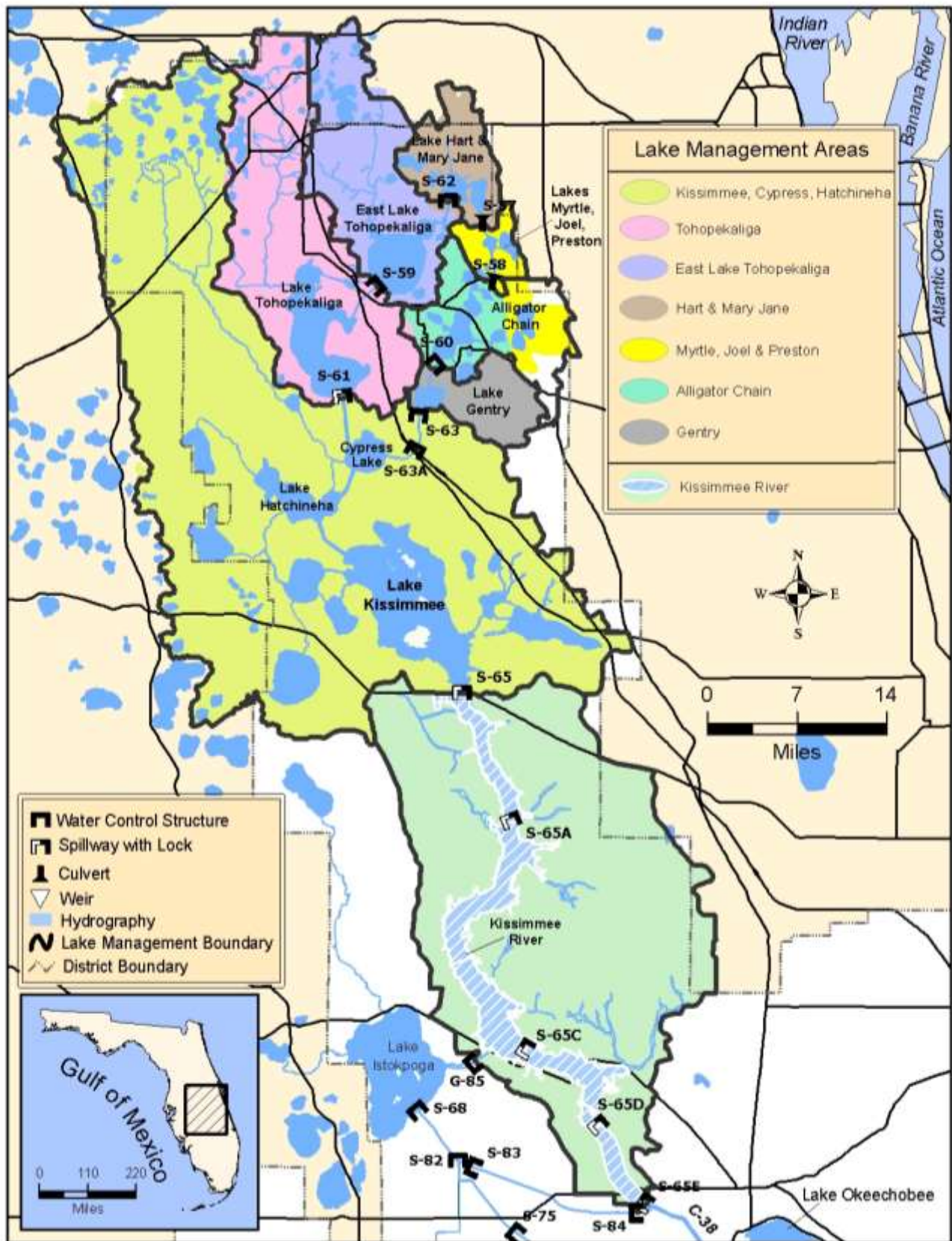


Figure 14. The Kissimmee Basin

## **LAKE OKEECHOBEE**

According to the USACE web site, Lake Okeechobee stage is at 14.92 feet NGVD for the period ending at midnight on June 20, 2016. This value is based on the use of four interior Lake stations (L001, L005, L006, and LZ40) and four perimeter stations (S352, S4, S308 and S133). Lake stage increased by 0.19 feet over the past week and is 0.68 feet higher than it was a month ago and 2.45 feet higher than it was a year ago (Figure 1). The Lake is in the Low Flow Sub-band (Figure 2). According to RAINДАР, 1.28 inches of rain fell directly over the Lake during the past seven days. The surrounding watershed experienced generally higher rainfall amounts.

Based on USACE reported values, current Lake inflow is approximately 9,890 cfs. Flows are listed below.

<b>Structure</b>	<b>Flow cfs</b>
S65E	5470
S154	105
S84 & 84X	1973
S71	596
S72	121
C5(Nicodemus slough dispersed storage)	-105
S191	300
S133 PUMPS	130
S127 PUMPS	0
S129 PUMPS	74
S131 PUMPS	49
S135 PUMPS	0
Fisheating Creek	1178
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 5,680 cfs exiting at S77 (4,726 cfs), S308 (1,754 cfs) and to the L8 canal through Culvert 10A (200 cfs). Water supply demands remain low in the EAA. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 3,300 cfs.

Change in elevation equivalents and average weekly flows for major structures are presented in Figure 4. Weekly average values for S77 and S308 are based on USGS data for the below structure gauges.

The most recent MODIS satellite images for June 14 and 19 appear to indicate the existence of algal bloom development across a large portion of the central pelagic zone (Figure 5). Cyanotoxin data collected by the Florida Department of Environmental Protection for two pelagic zone stations on 6/14/2016 support the MODIS imagery (Figure 6).

### **Water Management Recommendations**

The winter/spring dry season has ended and despite continued high release rates through S77 and S308, Lake stage rose 0.19 feet over the past week. It is unclear whether any additional short-term recession of Lake stage is to be anticipated unless it results from USACE management actions or



unusually dry climatic conditions. The current Lake stage is too high and the ascension rate is too rapid for this time of year and not beneficial to any remaining breeding snail kites. It may also result in an increased loss of submerged aquatic vegetation and inundation of apple snail eggs. There appears to be an increase in the occurrence of cyanobacterial blooms and associated elevated toxin levels as well. Future short-term recommendations are highly dependent on the near-term rainfall patterns and amounts. The goal should be to limit the rate of Lake stage increase or initiate an unseasonable recession in Lake stage to avoid exceeding the top of the preferred stage envelope (15.5 feet NGVD) during the wet season.

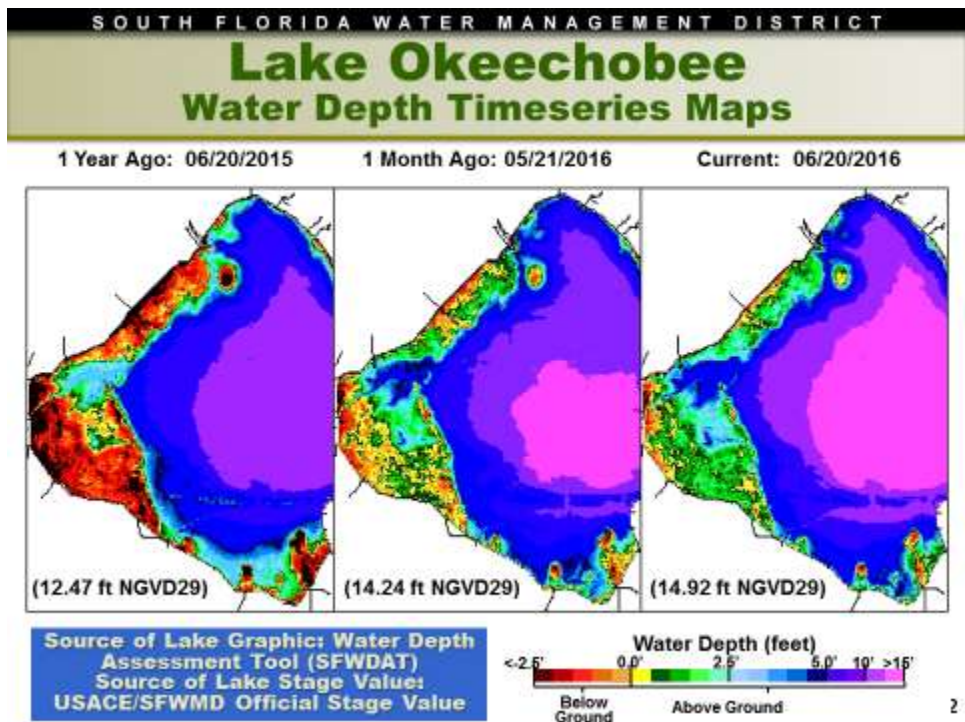


Figure 1

## Lake Okeechobee Water Level History and Projected Stages

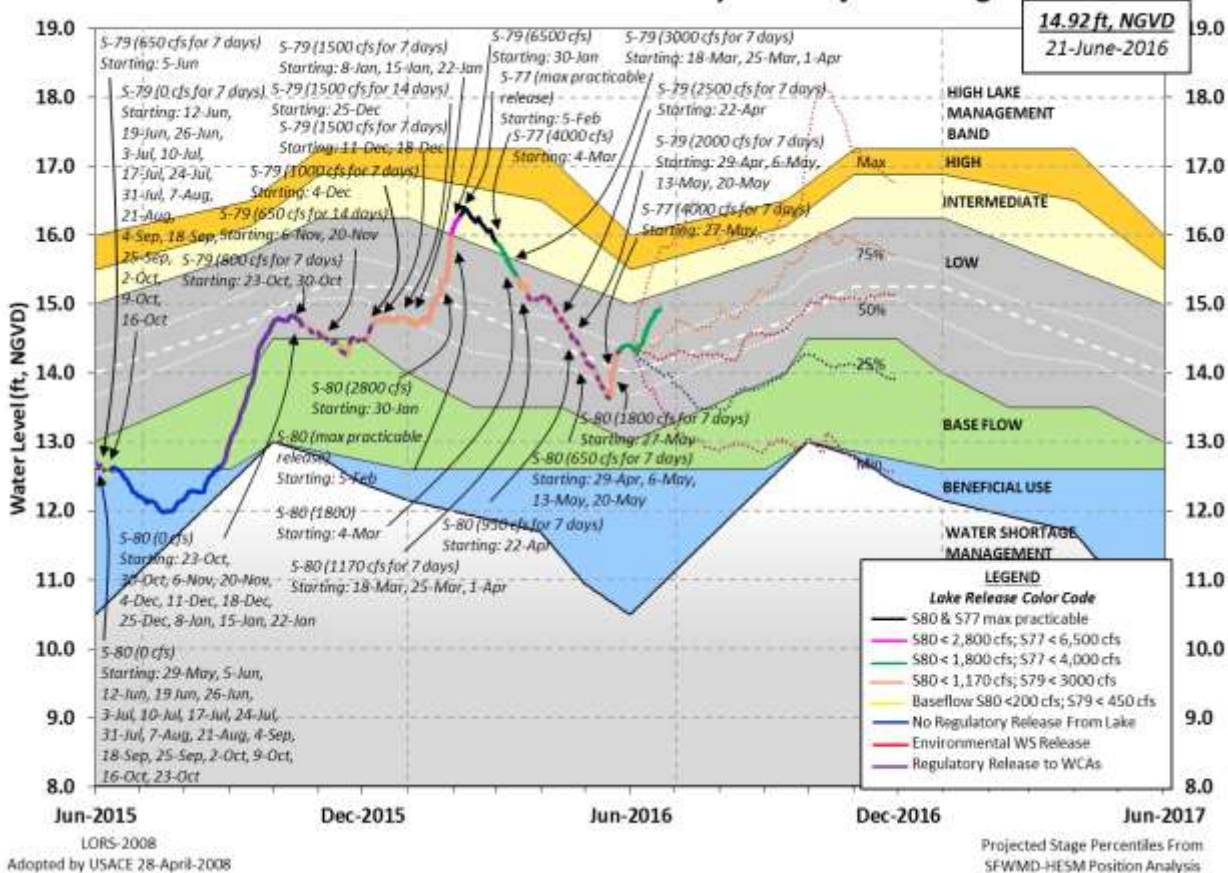


Figure 2

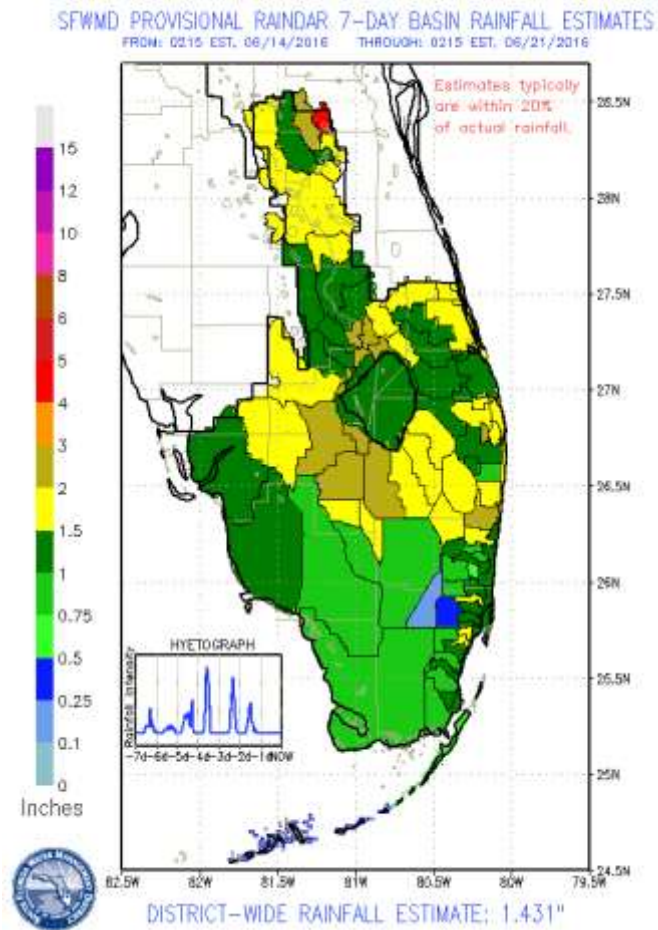


Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	6692	0.221
S71 & 72	762	0.025
S84 & 84X	2289	0.076
Fisheating Creek	2376	0.078
Rainfall	N.A.	0.107
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	4289	0.142
S308	1560	0.052
S351	0	0.000
S352	0	0.000
S354	0	0.000
L8	276	0.009
ET	3300	0.109

Figure 4

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# Lake Okeechobee

## Algal Blooms

### Unvalidated and Experimental Data

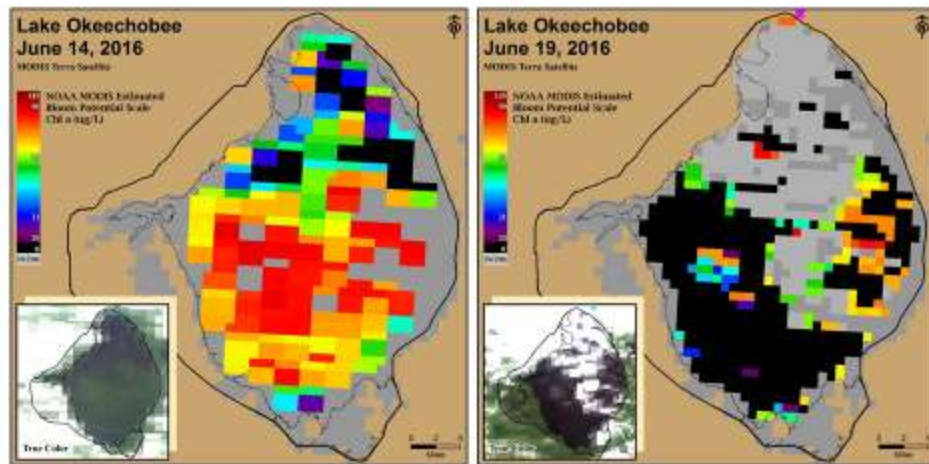


Figure 5

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# Lake Okeechobee

## Algal Blooms

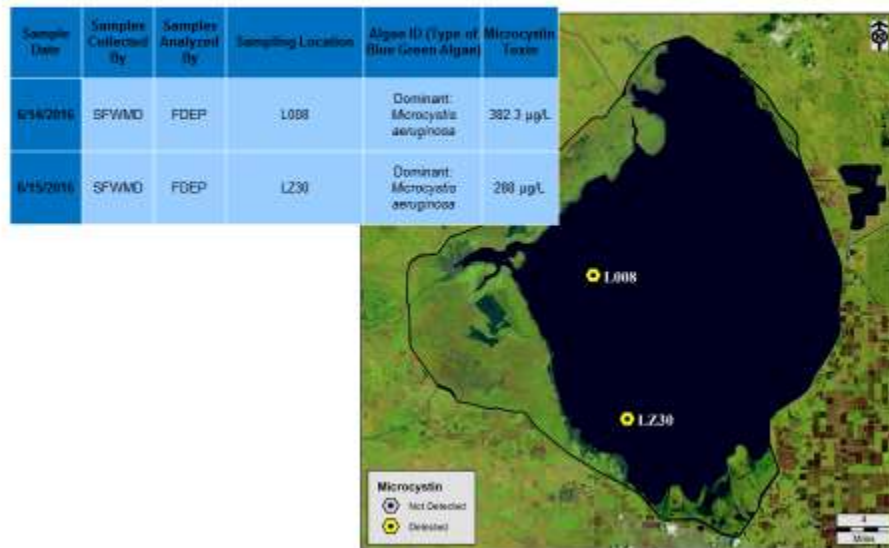


Figure 6

### Lake Istokpoga

The Lake Istokpoga regulation schedule has returned to its annual low pool stage of 38.25 feet NGVD. Lake stage is 38.20 feet NGVD and is currently 0.05 feet below regulation (Figure 7). Average flows into the Lake from Arbuckle and Josephine creeks were 1,243 and 311 cfs respectively, slightly lower



than the preceding week. Average discharge from S68 and S68X this past week was 2,577 cfs, similar to the preceding week. According to RAINDAR, 1.22 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

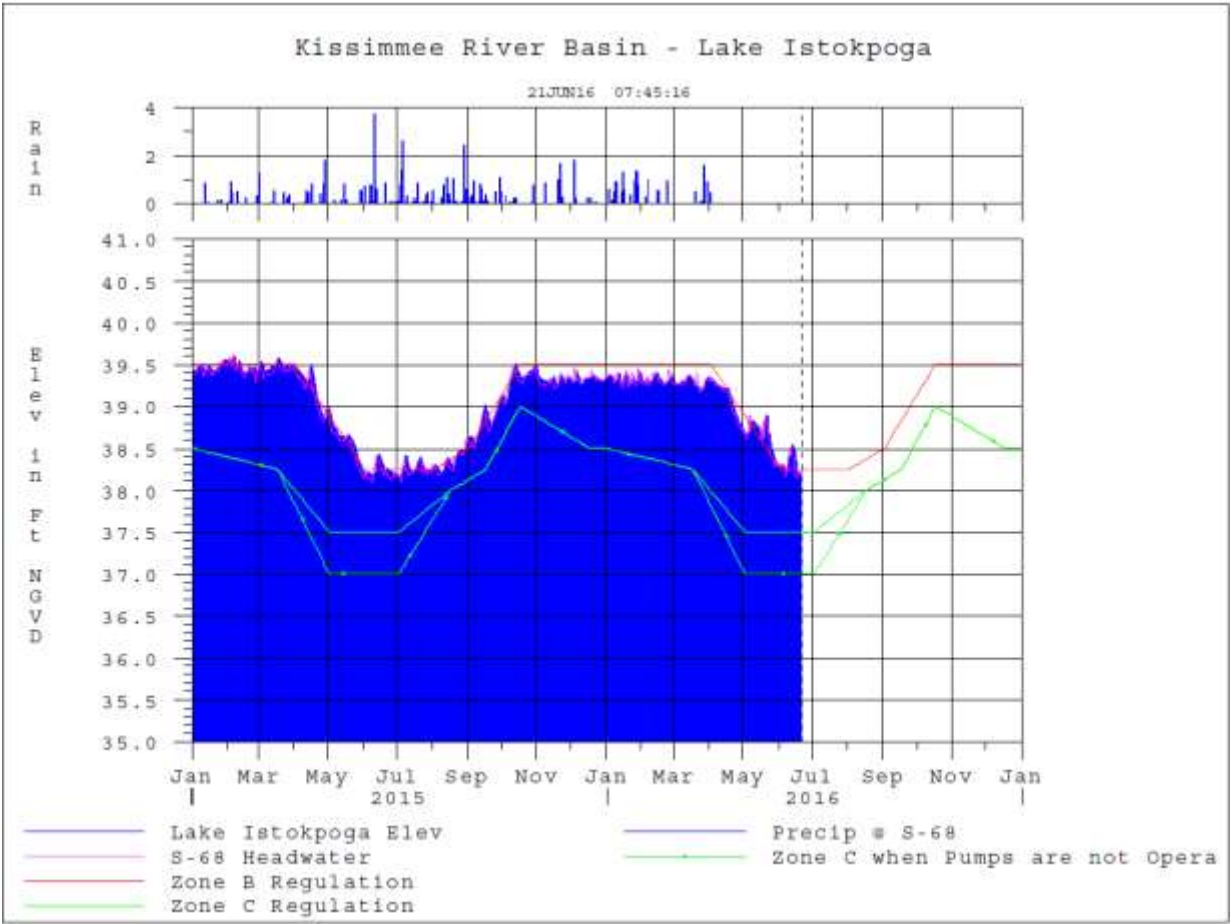


Figure 7

## ESTUARIES

### St. Lucie Estuary

Over the past week, provisional flows averaged about 1,856 cfs at S-80, 1,560 cfs downstream of S-308, 562 cfs at S-49 on C-24, 980 cfs at S-97 on C-23, and 153 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 571 cfs (Figures 1 and 2). Total inflow averaged about 4,122 cfs last week and 3,448 cfs over last month.

Over the past week in the estuary, surface salinity remained about the same to US1 Bridge and increased downstream (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 2.7. Salinity conditions in the middle estuary are in the poor range for the adult eastern oyster and have been for 26 consecutive days.

Table 1. Seven-day average salinity at three monitoring stations in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (N. Fork)	<b>0.5</b> (0.5)	<b>1.0</b> (1.1)	NA <sup>1</sup>
US1 Bridge	<b>1.8</b> (1.7)	<b>3.6</b> (2.8)	10.0-26.0
A1A Bridge	<b>9.6</b> (7.0)	<b>19.6</b> (16.0)	NA

<sup>1</sup>Envelope not applicable

### Caloosahatchee Estuary:

During the past week, provisional flows averaged approximately 4,289 cfs downstream of S-77, 5,580 cfs at S-78, and 9,047 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 1,627 cfs (Figures 5 and 6). Total inflow averaged 10,674 cfs last week and 7,551 cfs over last month.

Over the past week, salinity decreased throughout the estuary (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Shell Point, are in the fair range at Sanibel, and has been in the poor range at Cape Coral for 27 consecutive days (Figure 9). The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.2 at Ft. Myers. Salinity conditions at Val I-75 are in the good range for tape grass.

Table 2. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA <sup>1</sup>
*Val I75	<b>0.2*</b> (0.2*)	<b>0.2*</b> (0.2*)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA
Cape Coral	<b>0.2</b> (1.0)	<b>0.2</b> (1.1)	10.0-30.0
Shell Point	<b>4.9</b> (7.8)	<b>11.7</b> (14.2)	10.0-30.0
Sanibel	<b>21.6</b> (24.5)	<b>25.7</b> (28.5)	10.0-30.0

<sup>1</sup>Envelope not applicable, <sup>2</sup>Envelope is based on a 30-day average.

\*Val I75 is temporarily offline due to bridge construction,

Salinity values are estimated using models developed for this site.

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 3 as concentration ranges of Chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 3. Weekly ranges of Chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	6.2 – 6.75	5.0 – 6.6	2.2 – 9.1
Dissolved Oxygen (mg/l)	2.2 – 3.9	3.2 – 5.7	2.7 – 6.5

The Florida Fish and Wildlife Research Institute reported on June 17, 2016, that *Karenia brevis*, the Florida red tide organism, was not present in samples collected from Lee County.

### Water Management Recommendations

Given the current estuarine conditions, there are no ecological benefits associated with additional releases from Lake Okeechobee.



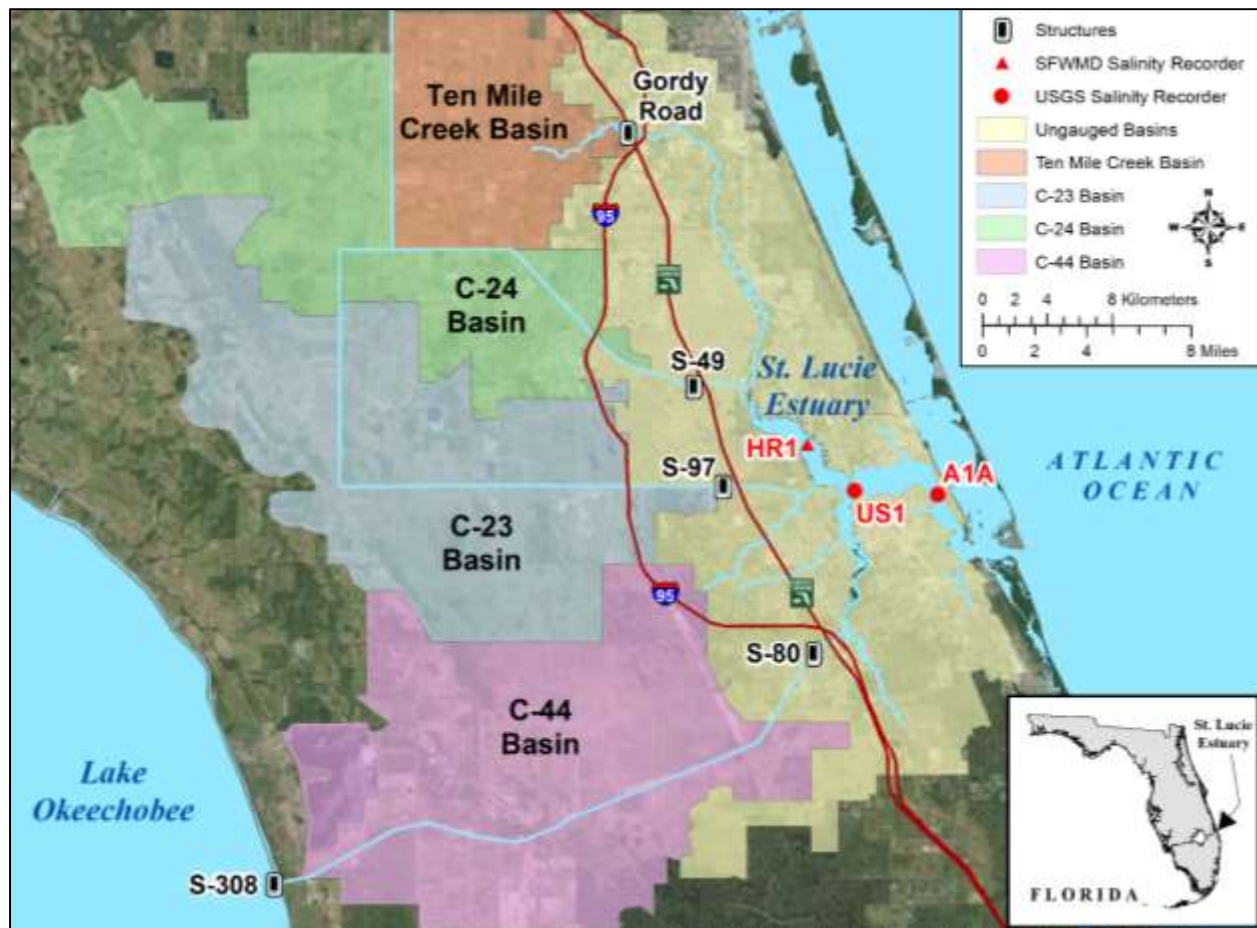


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

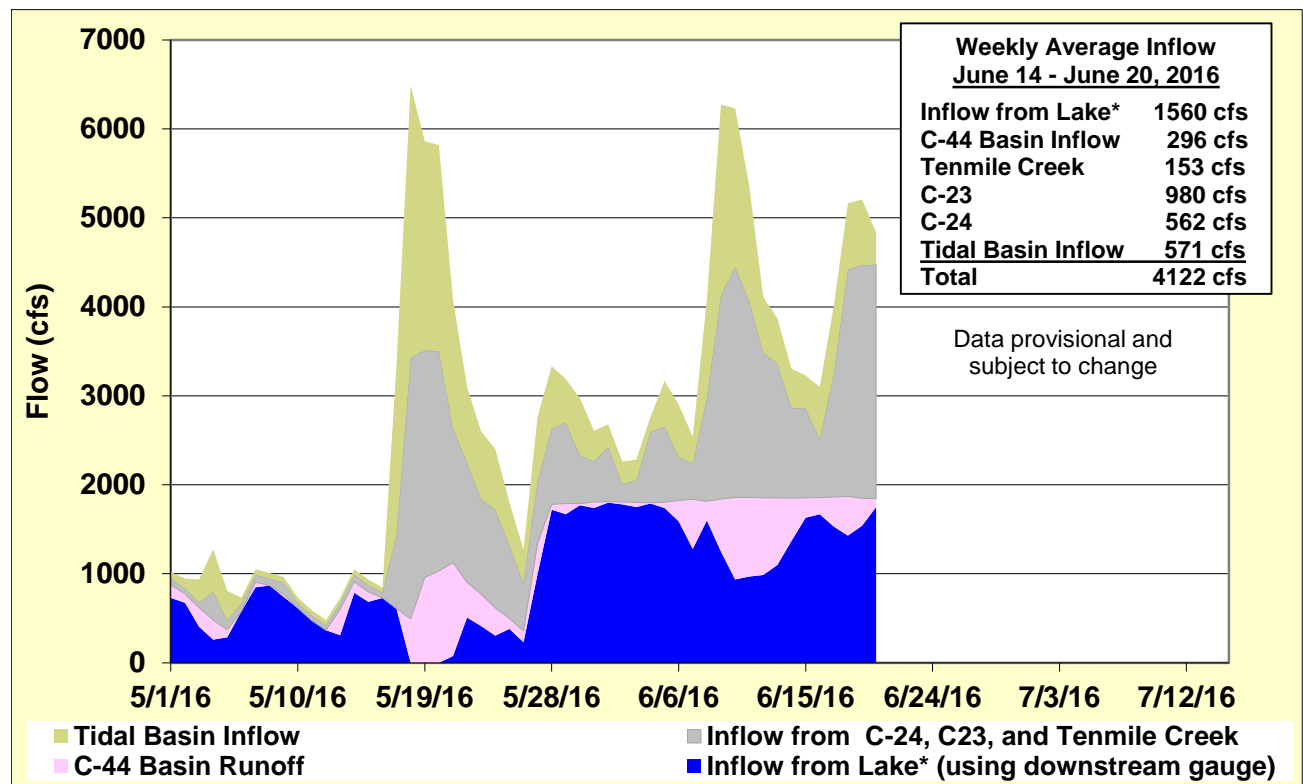


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

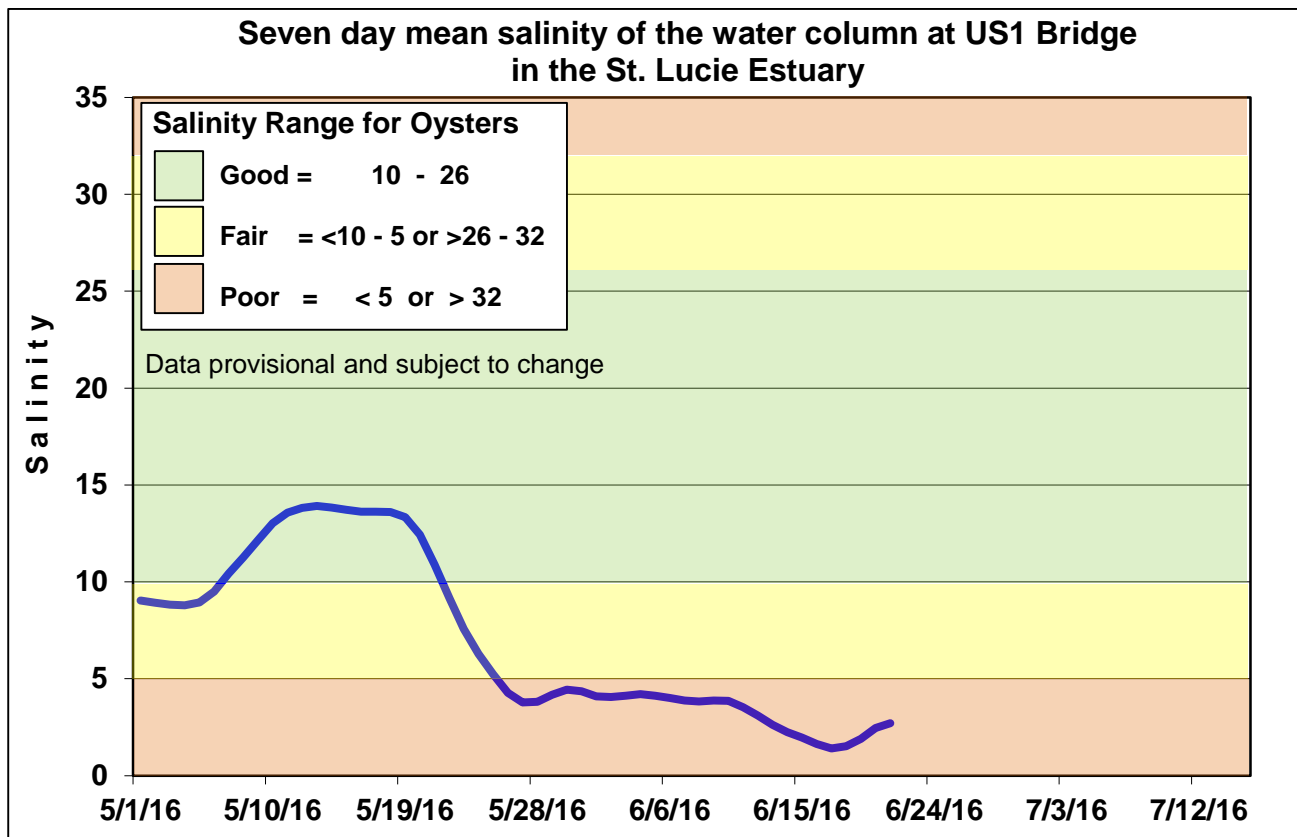


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

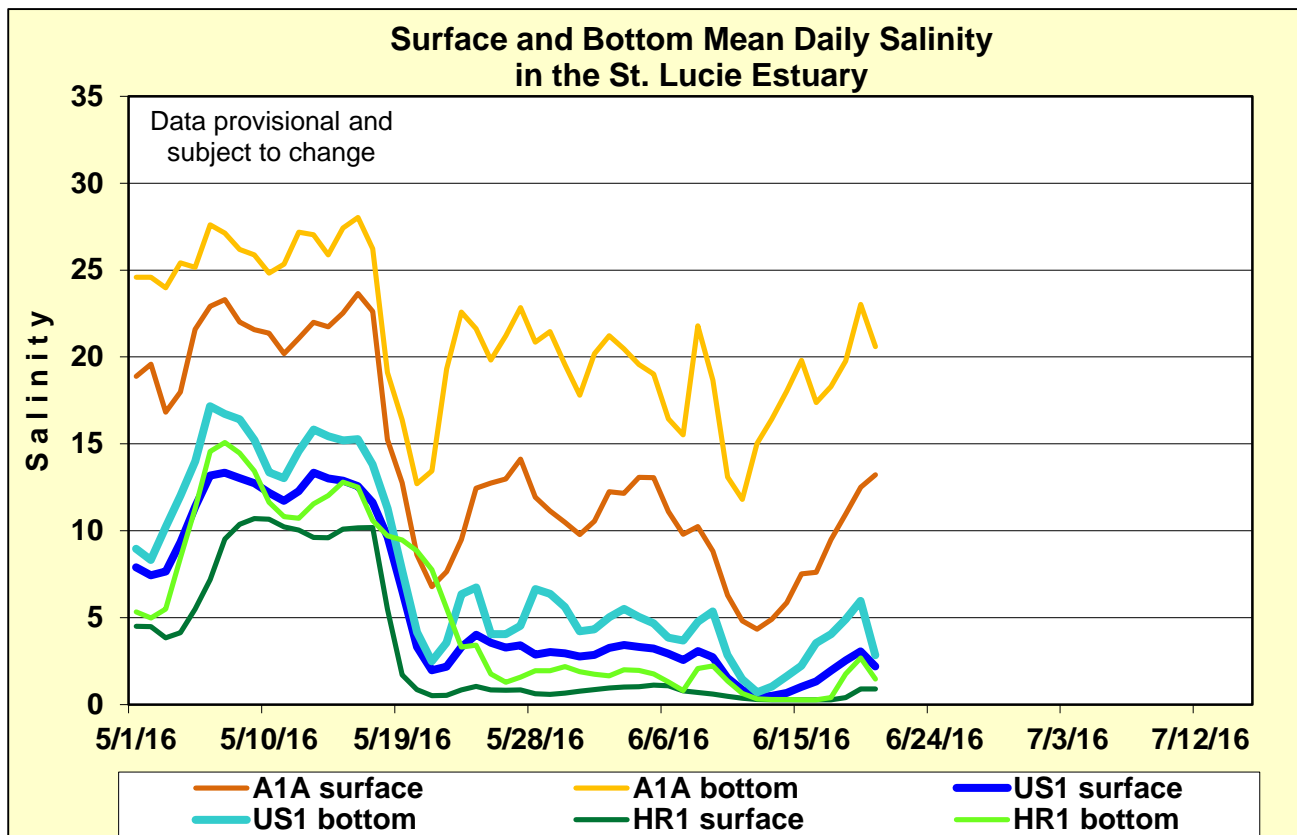


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

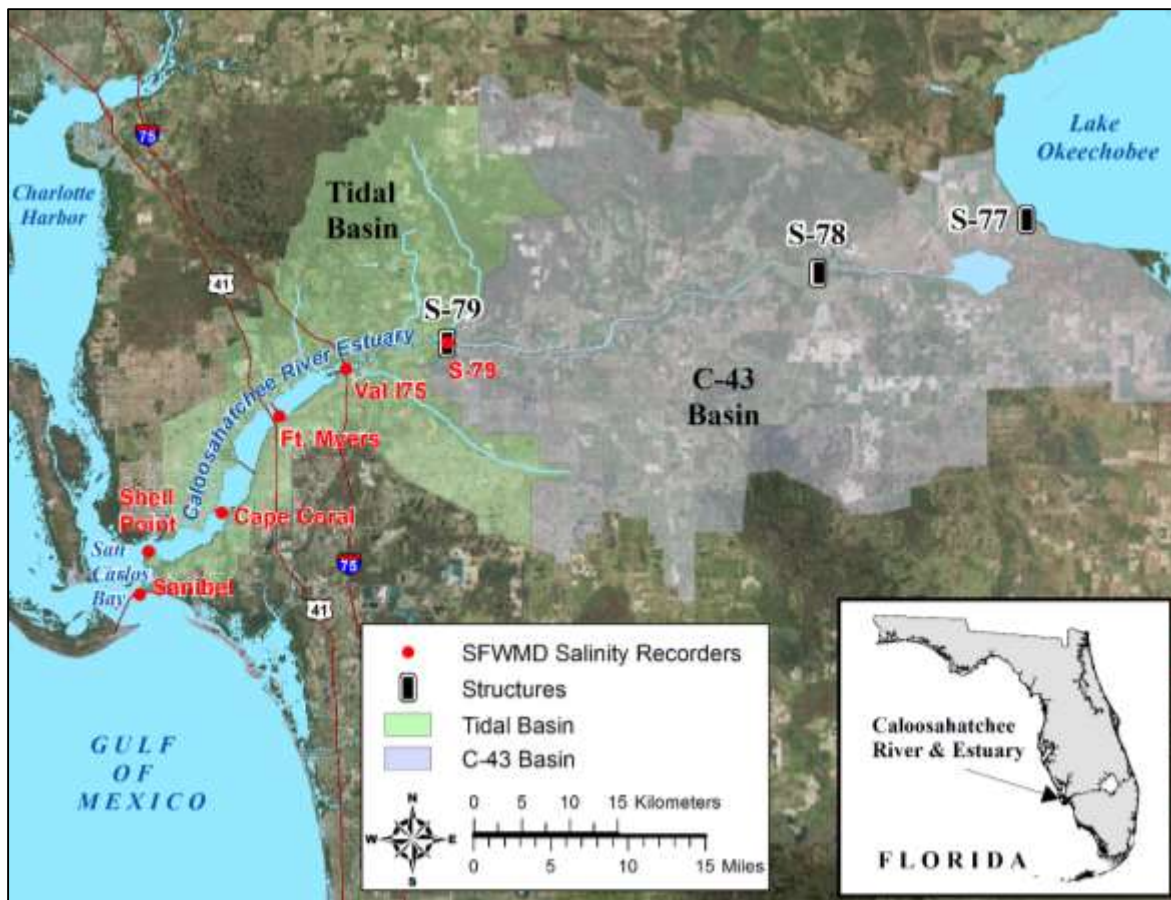


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

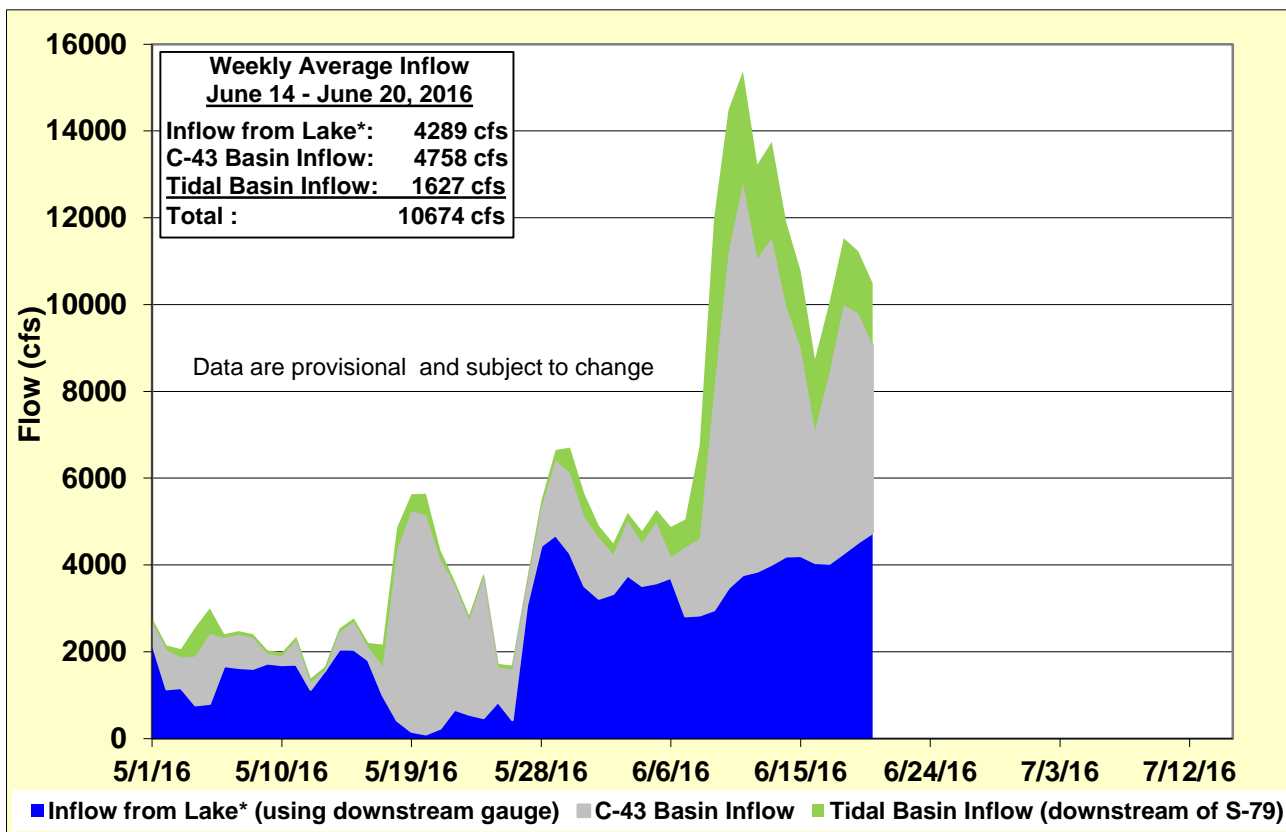


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

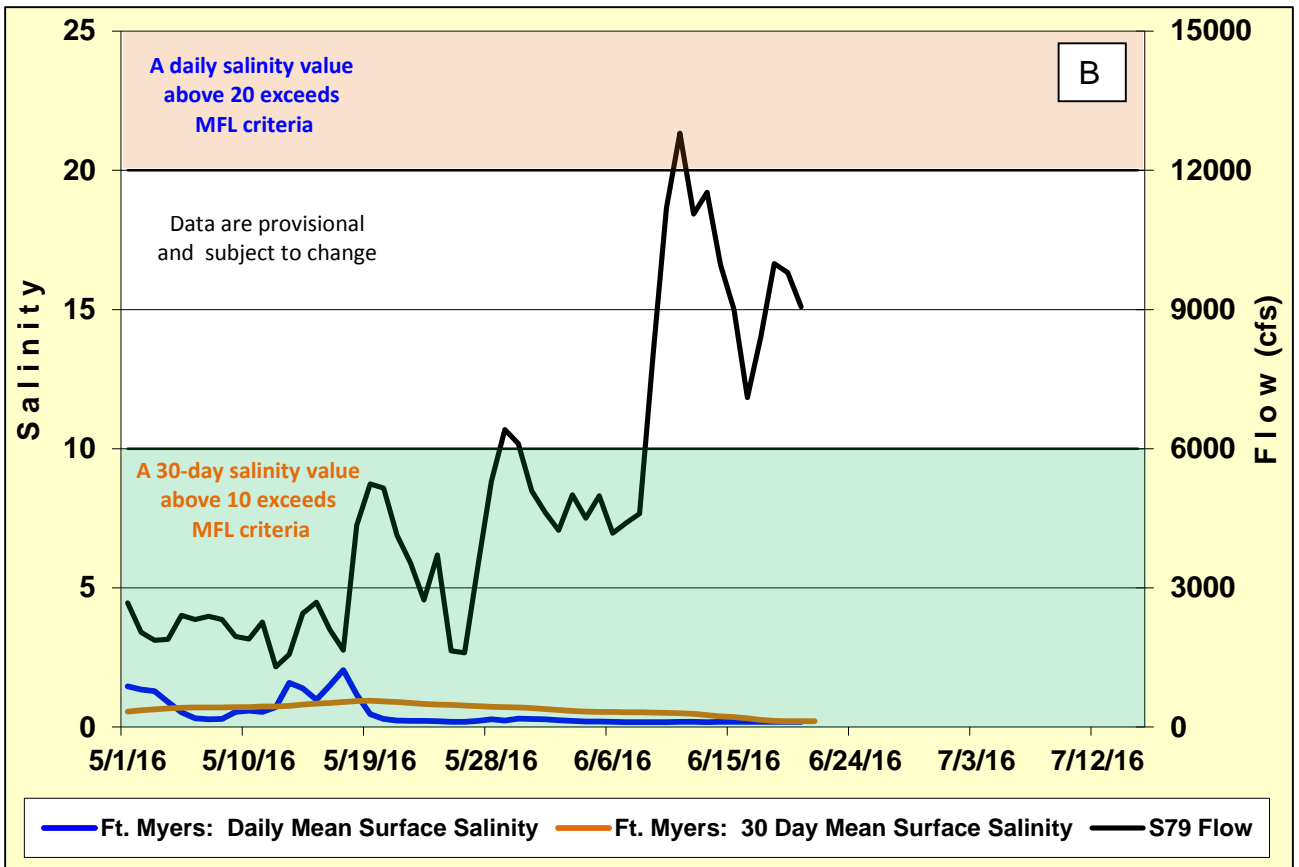
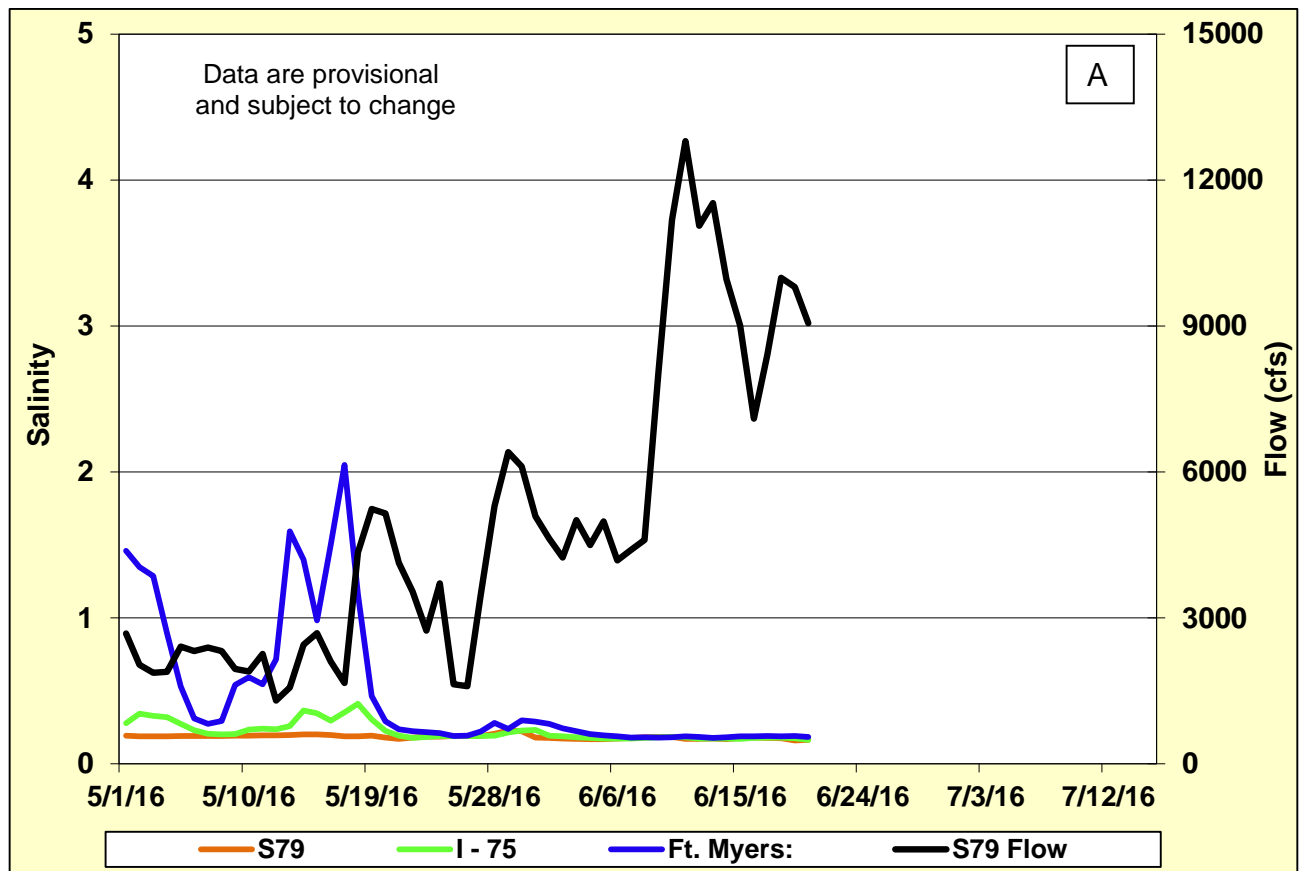


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

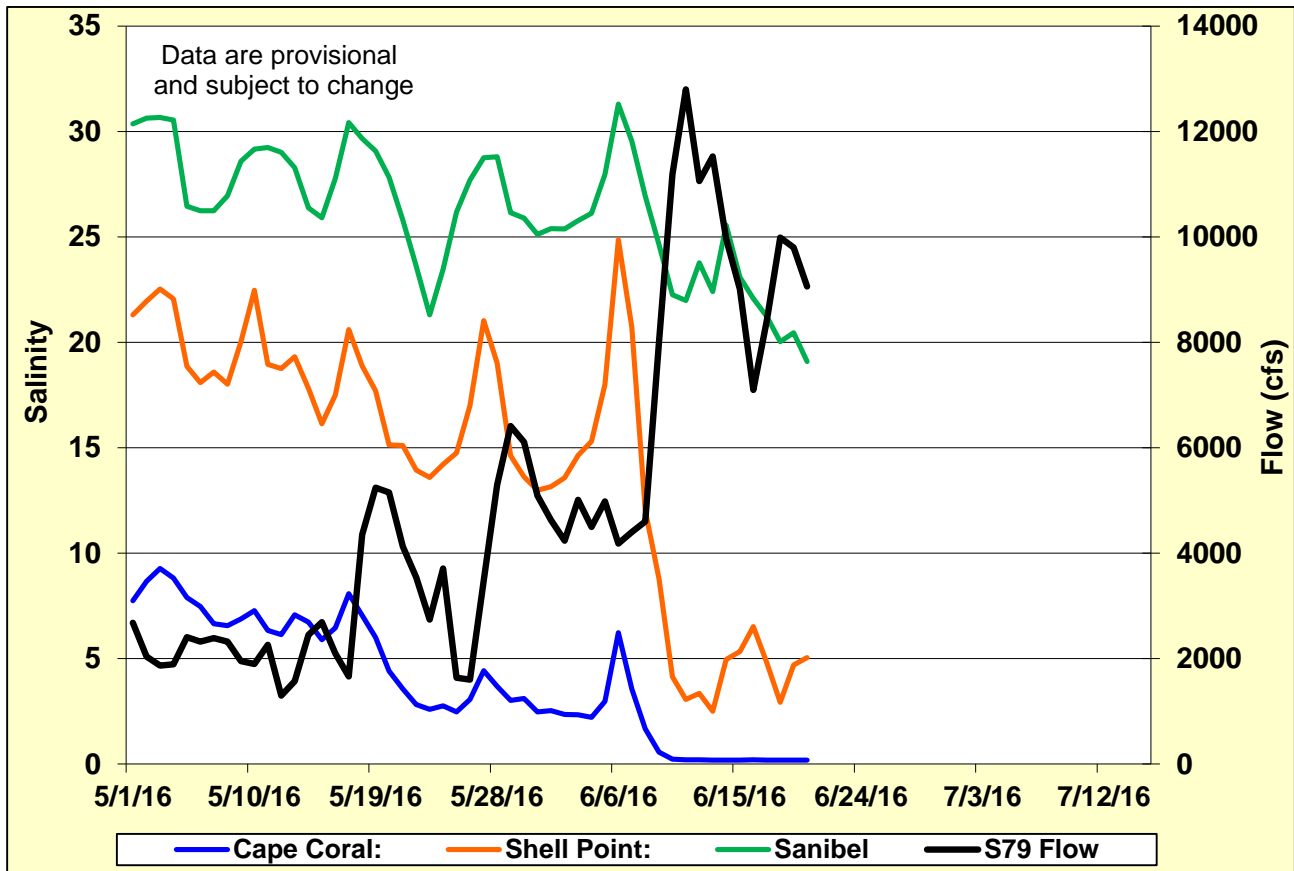


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

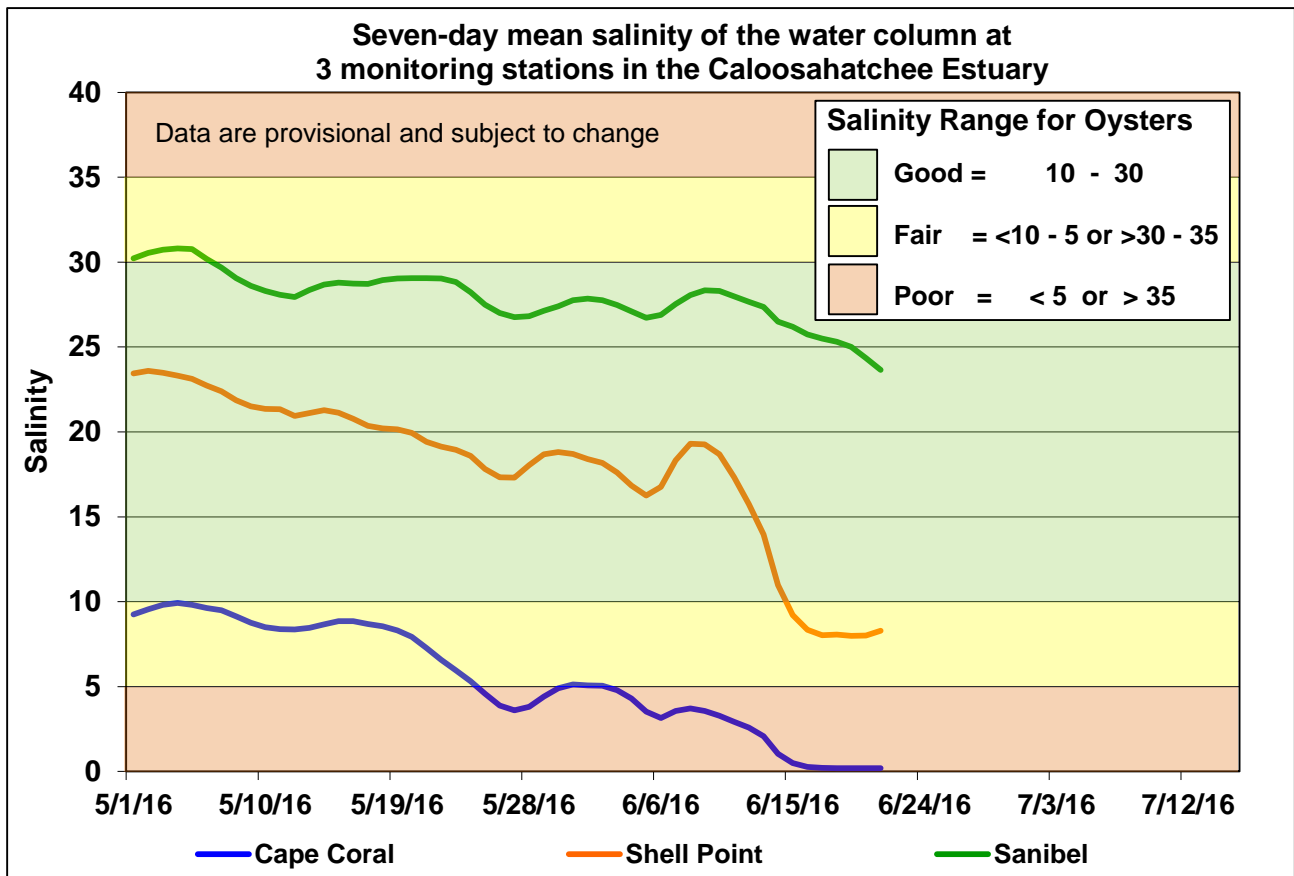


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

## **GREATER EVERGLADES**

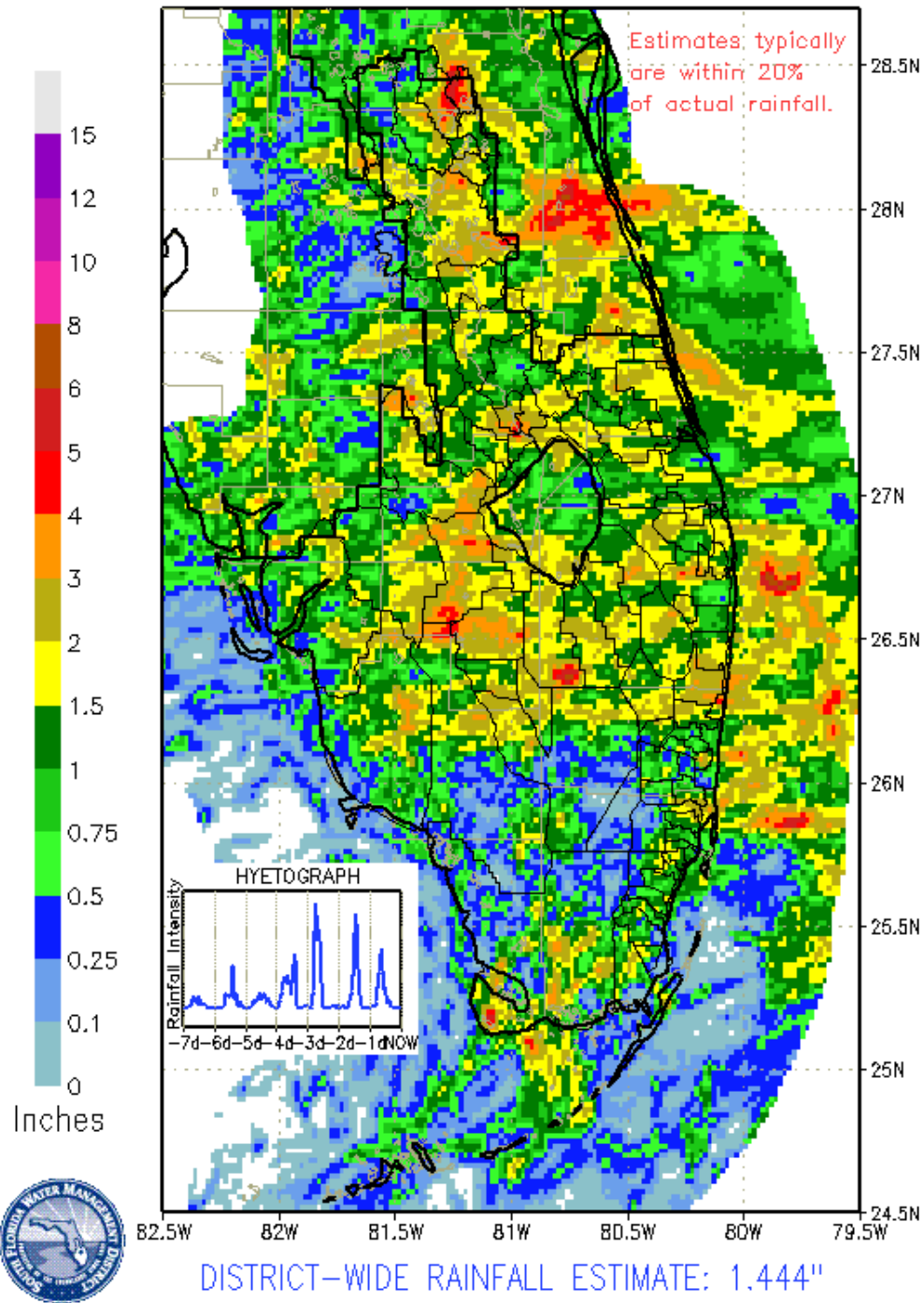
Rainfall was moderate last week with basin averages ranging from 0.25 inch to 1.64 inches; the local maximum rainfall of 5.50 inches occurred in ENP. Stage changes were mixed. Pan evaporation was close to the pre-project average (1.56 inches compared to the 1.51-inch pre-project average).

<b>Everglades Region</b>	<b>Rainfall (Inches)</b>	<b>Stage Change (feet)</b>
WCA-1	1.64	0.06
WCA-2A	1.64	0.06
WCA-2B	1.29	-0.01
WCA-3A	1.03	0.02
WCA-3B	0.25	-0.10
ENP	0.95	-0.17

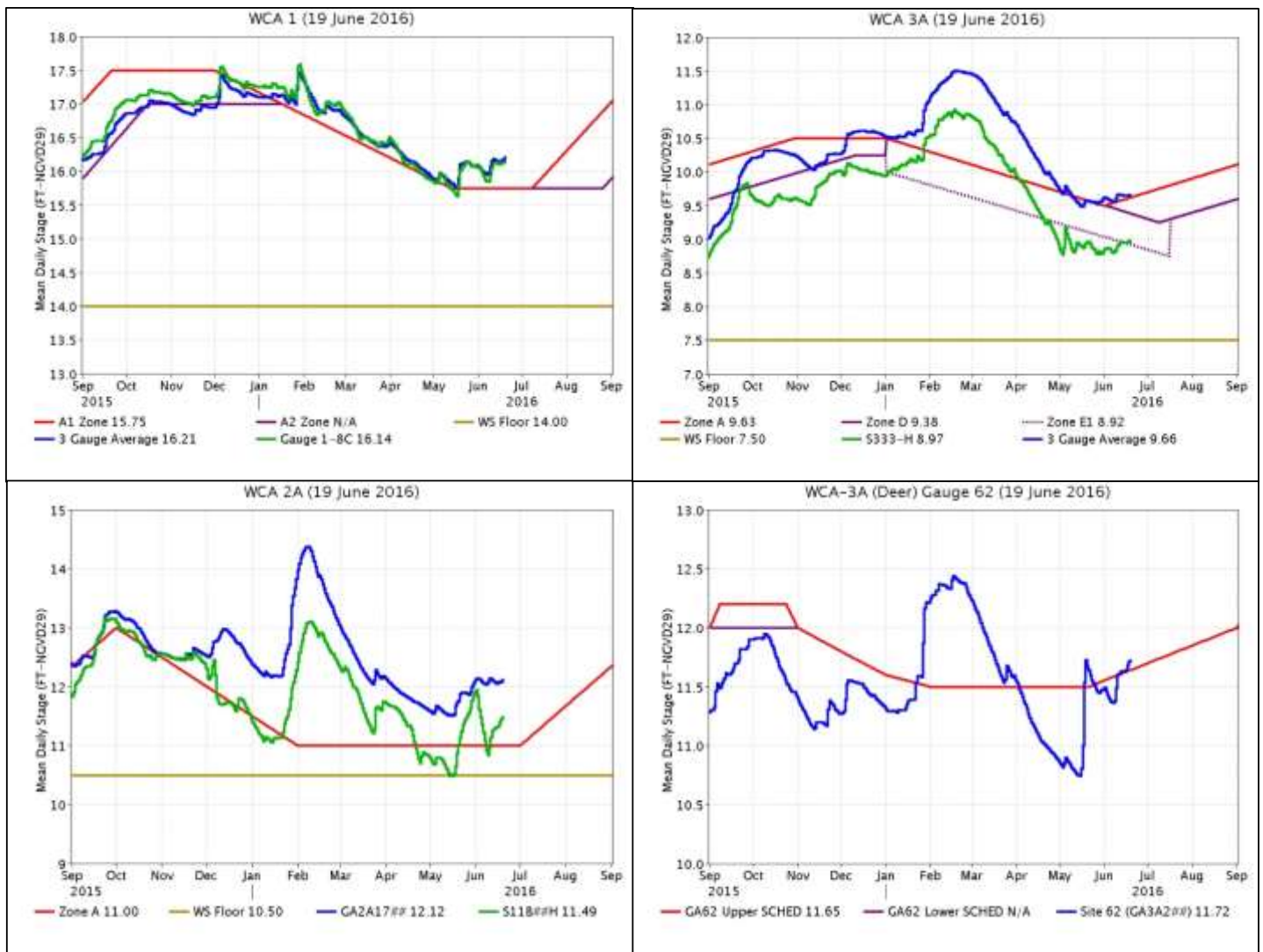


# SFWMD PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

FROM: 0515 EST, 06/13/2016 THROUGH: 0515 EST, 06/20/2016

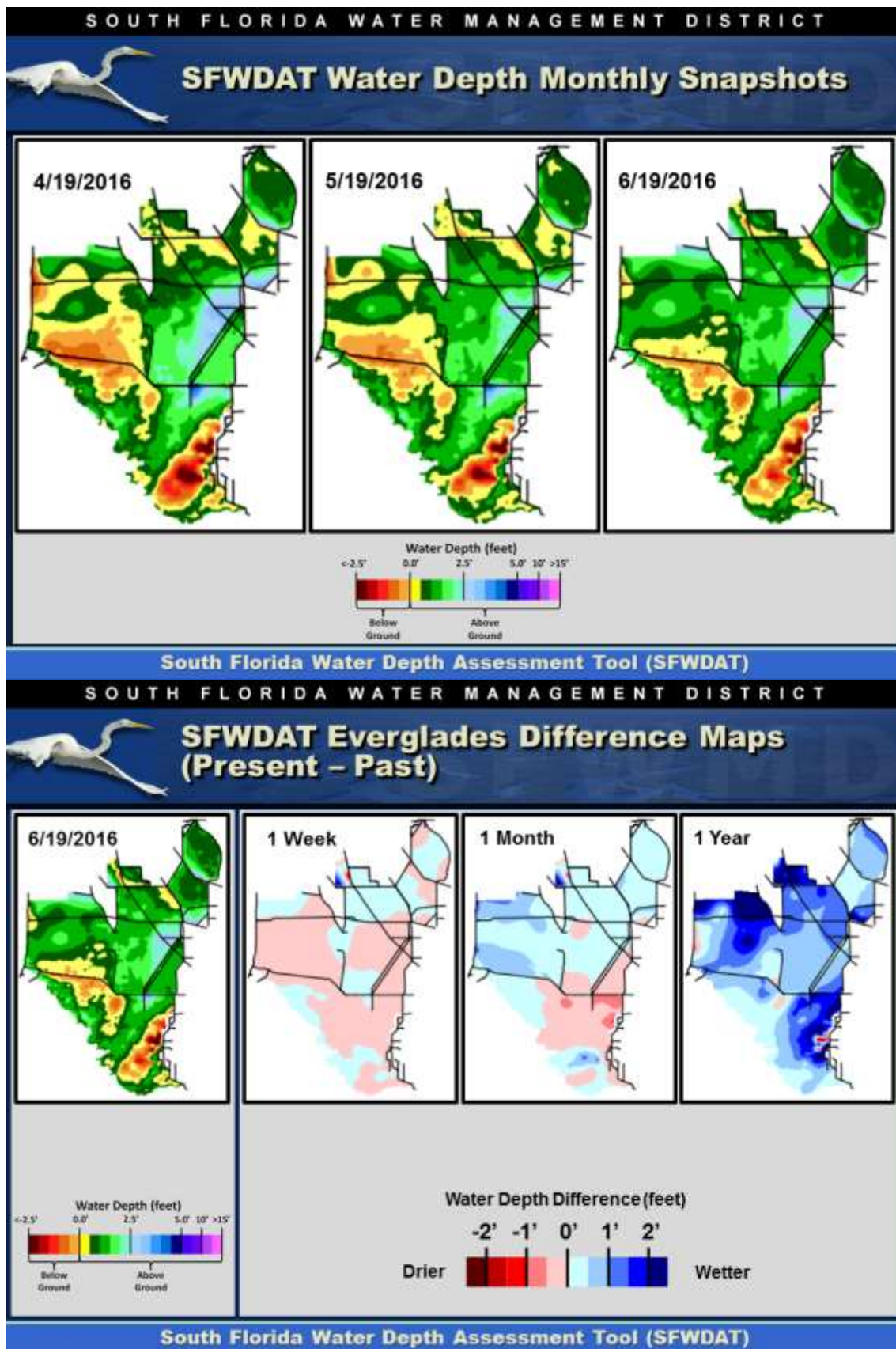


Regulation Schedules: Water levels are above regulation schedules. The WCA-1 three-gauge average is 0.46 feet above regulation. The WCA-2A stage rose slightly to 1.12 feet above regulation. The WCA-3A three-gauge average stage is 0.03 feet above regulation and the northwestern WCA-3A gauge stage (gauge 62) rose again to 0.07 feet above schedule.



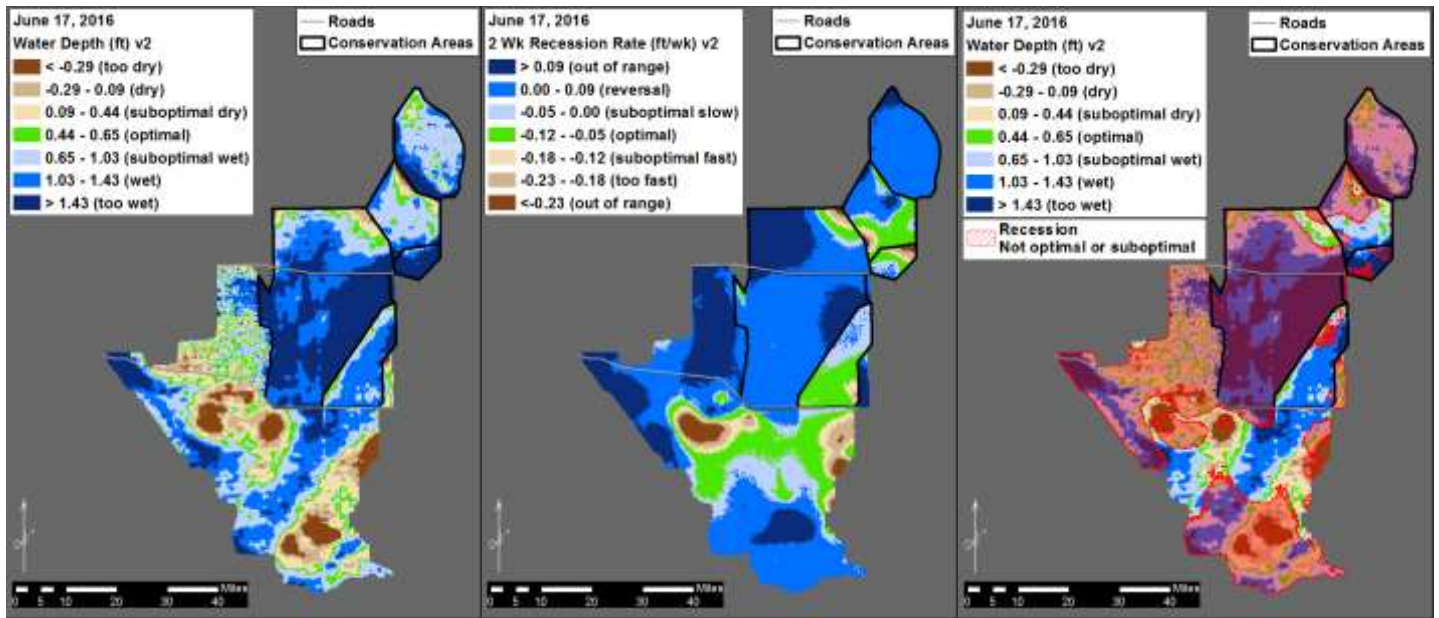
**Water Depths and Changes:** Water levels are higher than a month and two months ago. Water depths at the monitored gauges (except WCA-2B) range from 0.99 feet to 1.75 feet (in southern WCA-3A).

Stage changes were mixed last week. Gauge changes ranged from -0.17 feet to 0.12 feet. Compared to a month ago, stages are higher in most WCAs and lower in WCA-3B and much of ENP. All areas are slightly higher to over two feet higher than a year ago except for small areas in ENP, including part of the Cape Sable Seaside Sparrow subpopulation A habitat.

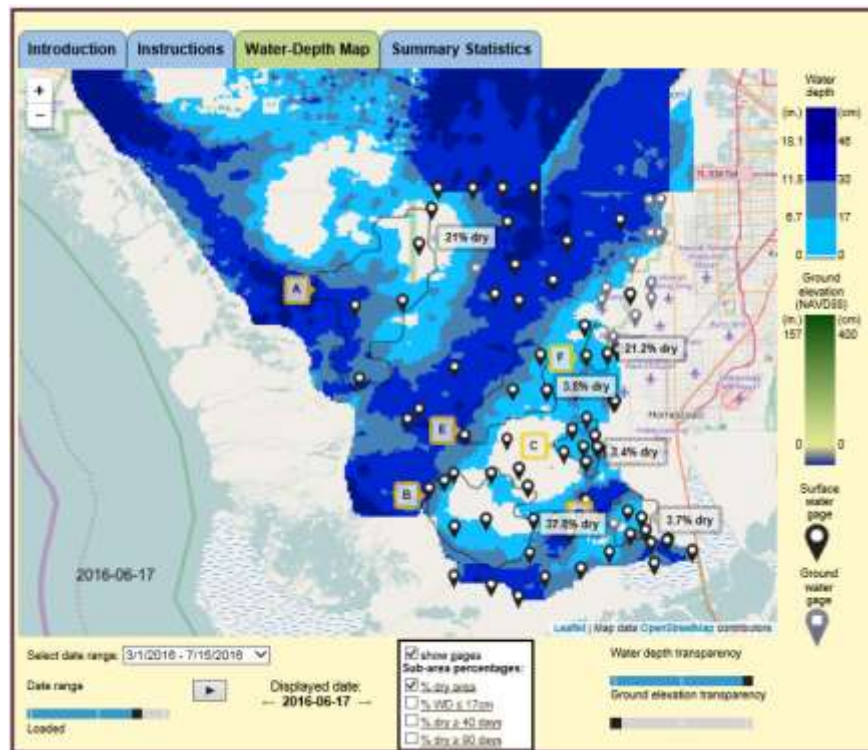


Wading birds: Foraging conditions are poor, so any remaining nesting birds must rely on foraging sites outside the WCAs.





Cape Sable Seaside Sparrows: The percent dry area is mixed relative to the previous week. Birds are still courting so there may be second nests attempted over the rest of this year's breeding season in dryer locations.

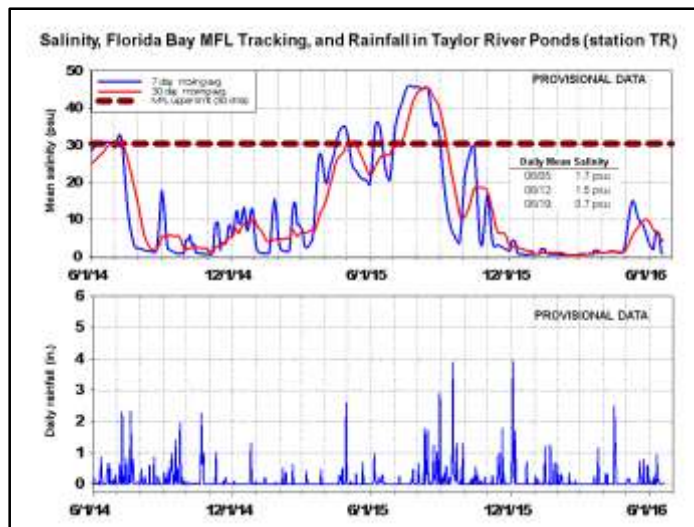
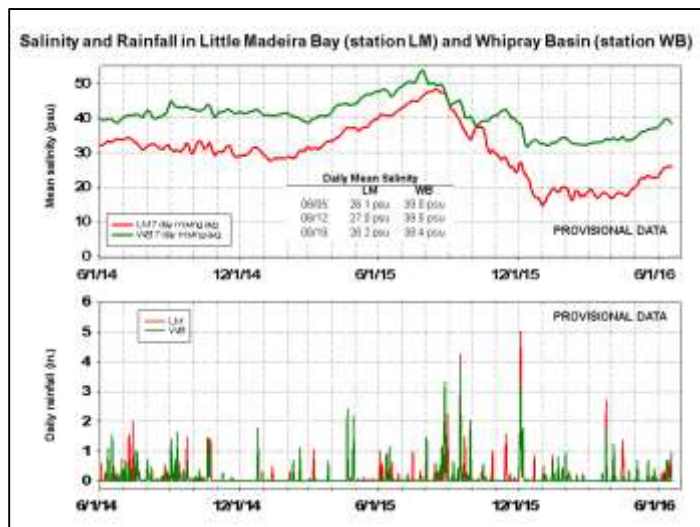


6/12/2016: CSSS-A 12.8%; CSSS-B 38.9%; CSSS-C 6.8%; CSSS-D 4.1%; CSSS-E 6.9%; CSSS-F 0%

Everglades National Park (ENP) and Florida Bay: Water levels generally decreased across Everglades National Park. Water levels in Taylor Slough and the ENP panhandle are now lower than a month ago except in southwestern Taylor Slough. Northern Taylor Slough remains 11 inches above average, and southern Taylor Slough is three to five inches above average.

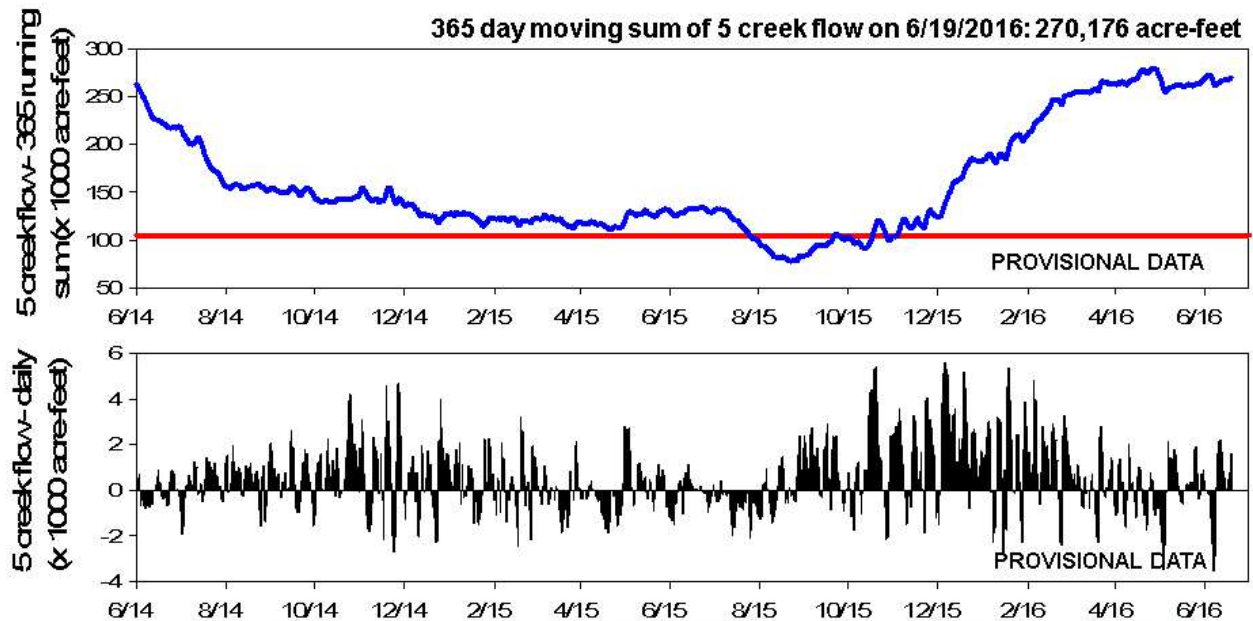


Salinities decreased by less than 2 psu across Florida Bay last week. Daily average salinities range from 24 to 40 psu with the highest salinity still occurring in the nearshore western embayments. All areas are within 4 psu of their seasonal averages. The MFL sentinel site TR in the mangrove zone has decreased to near fresh at 0.7 psu. The 30-day moving average salinity at TR decreased to 4.2 psu and should continue to decrease through the wet season.



The 365-day running summed cumulative flow from the five creeks feeding Florida Bay increased to 270,176 acre-feet (above the average of 257,628-acre feet). Creek flow is provisional data from the USGS and is highly variable.

## 5 Creek Cumulative Flow and Florida Bay MFL Flow Criteria Tracking



### Water Management Recommendations

- Throughout the wet season, water depths should remain below 2.5 feet through far southern WCA-3A to protect tree island forests.
- Water levels in the Cape Sable Seaside Sparrow habitats are high and need to continue to recede. Sparrows in dry areas are still courting and may be attempting to nest a second time.

Recommendations appear in the summary table below. The red text represents new or modified information or recommendations.



## Everglades Ecological Recommendations, June 21, 2016 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
<b>WCA-1</b>	Stages rose 0.03' - 0.12'	Rainfall, ET, management	Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
<b>WCA-2A</b>	Stage rose 0.06'	Rainfall, ET, management	Begin wet season operations for this area, including maintaining ascension rates <0.25 ft/week	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
<b>WCA-2B</b>	Stages decreased - 0.02' - 0.0'	Rainfall, ET, management	Follow normal seasonal practices. Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
<b>WCA-3A NE</b>	Stage rose 0.03'	Rainfall, ET, management	Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Supporting wading bird foraging is especially critical as this area contains the only remaining nesting wading birds. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
<b>WCA-3A NW</b>	Stage rose 0.10'	Rainfall, ET, management		
<b>Central WCA-3A S</b>	Stage fell -0.08'	Rainfall, ET, management	Limit ascension rates to extent possible with a maximum of 0.25 ft/week. Water depths should remain below 2.5 feet over this upcoming wet season. When flows are changed a gradual reduction is recommended (stepping down over several days).	Moderate recession rates would benefit habitat and wildlife. Keeping depths below 2.5' is important to allow tree island vegetation to recover from stress of the recent extended inundation duration. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
<b>Southern WCA-3A S</b>	Stage rose 0.04'	Rainfall, ET, management		
<b>WCA-3B</b>	Stages fell -0.08' to -0.13'	Rainfall, ET, management	Follow normal seasonal practices. Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of 0.25'/week will protect habitat and wildlife including reproducing apple snails.
<b>ENP-SRS</b>	Stage decreased -0.17'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTTP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities.
<b>ENP-CSSS habitats</b>	S-12A and S-12B remain closed to enhance dry-down.	Rainfall, ET, management	Follow rainfall plan for releases. Adhere to ERTTP closures for S12-A and B. Gradual reduction in flows through S333, S12C and D, as possible, is recommended (stepping down over several days). Reduced flows through S333 would benefit wildlife. Follow guidance in C-111 western spreader canal project operations manual.	Provide appropriate hydrological and habitat conditions for Cape Sable Seaside Sparrow breeding.
<b>Taylor Slough</b>	3-11 inches above average	Rain, ET, inflows	Move water southward as needed	Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream
<b>FB- Salinity</b>	-4 psu below to +4 psu above average	Rain, ET, inflows, wind	Move water southward as needed	Maintain lower salinity levels.